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MINING ON THE NORTH SHORE, LAKE SUPERIOR.

BY PETER McKELLAR.

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PROGRESS OF MINING ON THE NORTH SHORE OF LAKE SUPERIOR.

BY PETER McKELLAR.

The Thunder Bay District occupies the portion of Canada bordering on Lake Superior, next the United States Boundary. It is mountainous in character, with bold cliffs rising 300 to 1,400 feet above the lake and valleys. The valleys are numerous and generally fertile, some being of considerable extent, such as that of the Kaministiquia River, so that it is capable of supporting a much larger agricultural population than the people in general have any idea of. The many low and lofty islands, strewn along the coast and in the bays, render the scenery picturesque and beautiful.

DISTRIBUTION AND CHARACTER OF THE GEOLOGICAL FORMATIONS.

The geological formations of this section are:—The Laurentian Huronian, and the Upper Copper Rocks, named and described by Sir William Logan (see his "Geology of Canada"), afterwards described by others, and especially by Professors R. Bell and E. J. Chapman. The Laurentian and Huronian are the crystalline or azoic rocks, and the Upper Copper Rocks are supposed to be the equivalent of a part of the lower Silurian, and are divided into two divisions—the Upper and the Lower beds.

THE LAURENTIAN ROCKS.

This series occupies the Height of Land principally, touching the lake shore in but few places within this district. It consists of granite, gneiss, syenite, and micaceous schists, almost entirely. Its veins of quartz and spar carry copper and iron pyrites, also galena and zinc blende occasionally, but from my experience I am not favorably impressed in regard to its metalliferous qualifications.

THE HURONIAN ROCKS.

This series lies generally between the Silurian and Laurentian, striking occasionally in a north-easterly direction, in a broad belt or trough, back towards the Height of Land into the Laurentian. The principal area occupied by these belts stretches westward from Thunder Bay through Shebandowan Lake, thence on to the American boundary.

It consists of greenish and greenish-grey strata, with a dip nearly vertical. The principal portions have a slaty structure, consisting of chloritic, argillaceous, talcose, silicious, dioritic, and fine grain micaceous slates, with interstratified beds of massive diorite. It is from these slates we are expecting great results in mining.

It is only three years since the first silver mine (3 A) or any other mine (except the Little Pic Iron) was discovered in the Huronian, in this section. The following summer the Jackfish Lake Gold and Silver Mine was discovered in the same series, lying nearly 100 miles to the west of 3 A. Again, in the summer of 1872 the Heron Bay gold and silver lodes were discovered in the same formation, lying to the eastward of 3 A about 150 miles; also the Partridge Lake gold lode, which seems to traverse the same rocks, lying to the west of Mille Lac. Since then a number of promising silver bearing lodes have been discovered in the Huronian area, which occupies the coast opposite the Slate Islands.

THE LOWER BEDS OF THE UPPER COPPER ROCK.

These come next in ascending order. They occupy the coast and islands, with the exception of two or three pieces near Silver Harbor, where the older rocks come in, from the east end of Thunder Bay westwards on to the American Territory, showing also at a few points further east, underlying the Upper Beds.

They consist of layers of chert, dolomite, and iron ore, the latter being near the base, with thick beds of clay, slate, and grey argillaceous sandstone shales, interstratified with beds of columnar trap.

The intersecting veins carry silver, galena, zinc blende, and copper and iron pyrites, and other metals in small quantities. Until the discovery of the silver and gold lodes above referred to in the Huronian series, these slates were considered the silver-bearing formation of the country.

The Silver Islet, Thunder Bay, Sauniah (now the Duncan), Silver Harbor, Prince's Bay, Spar Island, Jarvis Island, McKellar's Island, Lambert's Island, Thompson's Island, McKenzie, Trowbridge, 3 B, and McKellar's Point veins are all silver-bearing, and intersect these slates, most of them being undeveloped.

THE UPPER BEDS OF THE COPPER ROCKS.

They occupy the principal part of the coast, and almost all the islands from Thunder Bay to the east end of Nipigon Bay.

They consist of sandstones, conglomerates, indurated marls, and some interstratified soapstone, crowned by an immense thickness of trappean beds, most of which are amygdaloidal in character.

The quartz and spar veins which traverse the sedimentary or lower portion, hold galena, copper ores, and zinc blende in very considerable quantities; also gold and silver, as shown by Professor Chapman in his Report of the Black Bay Lode, now the Enterprise Mine. The Silver Lake, Cariboo, and the above, are the principal lodes known in these strata.

The above trappean beds are the famous native copper-bearing rocks of the South Shore and Isle Royale. At the former place the workable lodes, conform with the strata dip, at a high angle, and are wonderfully rich. On our side these rocks dip at low angles, and, as far as I can understand, all the explorations and work for native copper were made on the intersecting veins instead of the bedded or conformable ones. It may be, that the difference of dip may have something to do with their richness, it being generally considered that strata with a high dip are more favorable for mineral veins than those with a low dip. However, since the discovery of silver in Thunder Bay, little or no attention has been paid to these copper rocks by the explorer, so that there is no knowing what they may turn out yet.

Native copper with associated nuggets of silver is the principal metal found in these rocks, but occasionally the sulphurets and other ores are met with in small quantities. The veins, in passing through them into the sandstone, seem to drop the native copper, it being replaced by the sulphurets. Many years ago the Montreal Company and others spent a considerable sum of money mining in these rocks without success, but that is of little importance, as there was ten times more spent in the south shore before the mines proved productive.

THEORETICAL VIEWS OF THE METALLIFEROUS CHARACTERISTICS OF THESE ROCKS.

Some geologists have expressed the opinion that the native copper of these lodes was derived from the copper ores of the Huronian by the fluid trap in passing up through them; and it is my opinion that the silver in the fissures of the Thunder Bay slates was derived from the same source by an aqueous solution. The way the discoveries of silver are distributed over that section would seem to substantiate this conclusion, for we find them distributed along parallel belts, which seem to agree in strike with that of the highly inclined Huronian strata which occupy the section, and must underlie these horizontal slates at no great depth. In other parts the veins of similar character in these slates have been searched in vain for silver, none being found excepting the usual amount found in galena. For instance, a belt along Thunder Bay from Lambert Island to the Shuniah Mine, a distance of about eighteen miles, shows silver at different places, which would require two argentiferous parallel strata, on this principle, to account for it. At the 3 A mine the Huronian are not overlaid by the Silurian slates—all these veins seem to conform with the strike of the Huronian and this belt of silver.

Again, take the other belt of silver discoveries—that is, Silver Islet, McKellar's Island, Thompson's Island, Spar Island, Jarvis Island, McKellar's Point, and 3 B, in each of which the silver shows. It is about 30 miles long, running nearly parallel to and lying about 20 miles to the S.E. of the above mentioned silver belt. Here we find all the principal fissure-veins bearing N.N.W. and S.S.E., crossing the strike of the Huronian and the Thunder Bay silver veins; but, strange to say, the general run of the silver conforms with the latter instead of with the veins in which it is found—each of these discoveries being on a different vein, and on the whole lying on a line bearing about W.S.W. and E.S.E., which, as above mentioned, seems to conform with the general run of the Huronian strata, which, in all probability, underlie these slates all through this locality. There seems to be another run of silver nearly parallel with this, lying two or three miles to the north, on these same N.N.W. veins; for silver has been found on the McKenzie locations to the north of 3 B; on the Prince's Bay locations to the north of Spar Island; on Pic Island to the north of McKellar's Island, and, I believe, in one of Wood's locations to the north of McKellar's Point, the distance between the two extremes being about twenty miles. Here we find two belts, as it were, of silver, the same as at Thunder Bay, which, if this theory were correct, would show the presence of two or more argentiferous strata in the Huronian, which seems not at all unreasonable, as auriferous and other metalliferous strata are known to exist in other parts of the world.

For example, the late discoveries on the opposite shore of Lake Superior, at Iron River, near Ontonagon, show that the silver, both native and sulphuret, exists in large quantities in a sedimentary, sandstone, and clay slate, associated with the ores of copper. The silver is found finely disseminated through the upper layer of a thick bed of slightly metamorphosed sandstone; also in the lower layers of the black clay slate, which immediately overlies it. The change in the character of the sedimentary deposits at this point shows that a great geological change of some kind had taken place there at the time of its deposition, to which, no doubt, the presence of the silver is due. Here the general dip seems to be at a low angle to the north-east, into Lake Superior, but the whole has been pressed laterally into undulations nearly at right angles to the direction of the dip, so that the outcrop of the lode has a zigzag course, resembling somewhat that of a rail fence. I have received my information from

Messrs. Donald and Archibald McKellar, who had taken specimens from the spot and geological notes on the ground, which, upon being laid down on paper, proved to be correct.

To return to the Thunder Bay subject. I may mention that the above theory is simply an opinion, which further discoveries may show in a different light.

The Silver Islet vein, though so rich on the Islet, shows little or no silver on the island near the shore, nor on the mainland, where several pits have been sunk, though it is large and well defined, carrying galena, zinc blende, and iron pyrites.

There is a peculiar metalliferous dyke of diorite (Macfarlane's Band), about ten chains wide, passing along the above mentioned line, by Silver Islet, McKellar's Island, &c., which differs in appearance from any of the dykes I have seen in the country. It contains several ores, and in places appears rich enough to work for the copper pyrites.

Mr. Thomas Macfarlane, who discovered the Jarvis and Silver Islet silver lodes, was the first to bring it to notice. He accounted for the metalliferous character of these veins on the same principle as that of the Kongsberg silver veins that intersect the metalliferous Fahlbands. He considered the diorite, like the Fahlbands, to carry a number of metals, silver included, which were afterward deposited in larger quantities in fissures cutting it. The discovery of silver on it in so many places since would go to confirm this theory, but it would not account for the silver on the other side of Thunder Bay and other places, where there is none of this diorite. At the same time, the same beds of the Huronian Rocks that underlie the slates at the silver mines of Thunder Bay might on the other side of a trough or synclinal, throw up under the slates along the above-mentioned belt, on which the Silver Islet and Jarvis Island lie.

The diorite in coming through might carry some of the silver with it, and be argentiferous in some places, though not in others; for Dr. Ellis, of the School of Technology, Toronto, analysed a specimen of it, in which he found no silver. Of course more proofs are necessary to establish the above theory; at the same time it seems to me the most reasonable, when we find that similar strata, supposed to be of the same age, in Norway, contain argentiferous belts (Fahlbands), which enrich the fissure veins passing through them.

Let us suppose this formation in which the Fahlbands occur overlaid by beds of horizontal strata, the same as we have it on Lake Superior, and the fissures passing through them; there is no doubt the veins would be richer in the vicinity of the Fahlbands than away from them.

Believing in the above conclusions, I have much confidence in these veins in the slate that show silver, or at least much at surface, believing that the source lies in the strata beneath.

The change in size and character of the veins in passing from one horizontal bed to another does not seem to me to be cause for much alarm, especially where the thickness of the slates is not much, as is the case to the N.W. of Thunder Bay; if once established, as I believe it is, that these are not local gash veins, but true fissures, with the metalliferous source deeper down. The beds vary much in character, being composed of chert, dolomite, clay slate, and trap, some being more subject to contraction and expansion than others, and no doubt their powers or influences in depositing the metals and minerals in the fissures differ.

The veins in the Huronian and on the Macfarlane Band will not be subject to these changes, as they continue down in the same rock; yet they will be subject to changes, as all fissure veins are.

The history of each mine will be given in the order of its discovery.

PRINCES BAY, OR SPAR ISLAND SILVER MINE.

About twenty-eight years ago the Prince's Bay mine was worked by the owner, Colonel Prince, on Spar Island, and on the main shore for silver. The vein on the Island is large, well defined, and composed principally of spar. It intersects the above-mentioned dyke of diorite, bearing about N.N.W., with a dip nearly vertical. One of the ribs is charged with the sulphurets of copper and some native and sulphuret of silver. Two shafts were sunk—one 24 and the other 47 feet—but the work was stopped owing to a vein of water having been struck.

Two or three shafts (one 90 feet in depth) were sunk, and a level driven 165 feet on a large lode of quartz and spar, on the main shore, which was thought to be the same as that on the Island. It carries the ores of copper, galena, zinc blende, and some native and silver glance.

According to Sir Wm. Logan, there was a bunch of several hundred pounds of ore found which yielded 3 per cent. of silver—the silver containing a small amount of gold. He considered that the result would justify the further working of the mine for silver if not for copper.

The works were stopped, and have not since been resumed. I believe that the Island would turn out very rich if the water would allow of its being worked.

LANDS OF THE MONTREAL MINING COMPANY.

This Company engaged Prof. Forrest Sheppard, with a large party in the spring of 1846 (about the time the Prince's Mine was working) to explore and locate mining lands on Lakes Huron and Superior. During the summer they had located some eighteen blocks of land along the coast—the Jarvis and Silver Islet locations included—each block being two miles by five.

They spent considerable money mining on the native copper locations on St. Ignace and farther down the Lake, all of which were soon abandoned, their attention having been turned to the Bruce Mines.

Again in 1868, after the discovery of silver in Thunder Bay, the Company employed Mr. Thomas Macfarlane to explore and report on their lands; for which they were rewarded by the discovery of two silver lodes—the Jarvis and Silver Islet. From the latter they had extracted silver to the amount of several thousand dollars by the 1st of September, 1870, the day upon which the sale of their lands was concluded with the American Company, for the sum of \$125,000. Since then they have obtained a half interest in Thompson's Island. (For further particulars see the reports of the Jarvis, Silver Islet, and Thompson Island Mines.)

WALBRIDGE MINE.

After the Prince's Bay and Montreal Company suspended operations about 1847, the upper part of the Lake was almost entirely neglected, until 1863, when Walbridge & Co., of Detroit, bought the Walbridge Location, in the township of Paipoonge, three miles from the Kaministiquia, and seven miles from Fort William, for \$1,200 or \$1,400, from J. McIntyre, H. B. Co.'s Agent, J. R. McVicar, and E. McEachern.

This Company worked a party of six or seven miners during the summer and the following winter, cross-cutting the lode in several places, and sinking a shaft about 40 feet deep on the copper-bearing part of the vein. They took out a ton or two of ore, containing probably 40 to 50 per cent. of copper pyrites—and the miners said that it was improving as they went down, one stringer of ore in the bottom being about two to three inches, and increasing. I myself saw a very fine show of galena at one of the cross-cuts when they were working there.

The vein is well defined, very strong, 24 feet wide, composed principally of calc-spar and quartz, which hold galena, zinc blende, copper and iron pyrites, in bunches, stringers, and disseminated in grains. It dips at a high angle to the south, bearing nearly east and west, traced for a mile or two along its strike. It intersects the silicious and argillaceous beds of the Lower Beds of the Copper Rocks.

The developments were made with a view to sell the mine, which they failed to effect up to the present, and the mine has been idle since.

CARIBOO LODGE.

The explorer, Ned Duncan (Edward McEachern), well known on both shores, having spent about 25 years in that business, was mining with a party of men on the Cariboo Lode, near Black Bay, in the winter of 1863, in which he discovered a mass of galena, about three inches thick, nine feet long by five feet deep.

This vein runs along in a large trap dyke, bearing about east and west, with a vertical dip. The veinstone, which is quartz and spar, runs in bands, streaks, and bunches through the dyke, generally along the south wall, showing disseminated galena, zinc blende, and copper and iron pyrites. The dyke bears about E. and W., cutting a reddish granite, supposed of Laurentian age. Since then very little work has been done on it. I understand that it is owned by Dr. Duffield and others in Detroit.

I was told that Duncan McEachern, brother of the above-mentioned explorer, had discovered a rich show of galena on the same lode last summer. I was shown a fine specimen of it.

Ned Duncan, in his explorations in Thunder Bay, Black Bay, and other parts of the coast, had discovered many lodes carrying the ores of lead and copper, but none that looked like paying from the surface, so it was difficult to find a Company willing to test them in depth, as none had been proven in the country.

LOT 11.—LOCATION.

In the summer of 1863 my brother, John McKellar, and I discovered a large spar and quartz lode holding galena and copper ore in the township of Paipoonge, west of Thunder Bay, which my father, Mr. Duncan McKellar, sold to Walbridge, of Detroit, the following winter.

Having been pleased with the appearance of the country, we returned the following spring to renew our explorations.

THE NORTH SHORE, OR ENTERPRISE MINE.

We discovered many metalliferous veins, but none of importance, until the 16th of May, 1865, when my brother, Donald McKellar and myself, discovered the famous Black Bay lode on lot C, now known as the North Shore Mine.

The vein is 6 to 8 feet in width, the gangue being quartz, and calc, and heavy spars; with a lode of 3 to 4 feet wide of solid ore, consisting of a mixture of galena and copper pyrites, with a small quantity of the gangue.

Prof. E. J. Chapman, in his report of it, gives the percentage of the metals:—Lead, 47; copper, 9 to 11; and some copper ore ribs at 21 per cent.; besides an average of the precious metals of about \$17 of gold, and \$4 of silver to the ton.

The vein intersects the indurated marls of the Upper Bed of the Upper Copper Rocks near its junction with the granite. It strikes about E.N.E. and W.S.W., with a dip nearly vertical.

Two years ago we sold 400 acres on this lode to Mandlebaum & Co. for \$20,000. A small force was employed to open it out, and another to build a tramway to Black Bay, a distance of nearly seven miles; but owing, as I understand, to some financial trouble, they have been unable to complete it yet; so the hundreds of tons of ore taken out are lying there still.

A shorter and a better route for the tramway leads to a harbor of eleven feet of water on Pearl Bay. This discovery satisfied us and others that metals did exist in large quantities in the country.

Since writing the above, I understand that the Company has been reorganized under a new name—the Enterprise—and that they are going to commence operations immediately.

LITTLE PIC IRON MINE.

In the spring of 1865 Mr. John McKellar, with Mr. W. Pritchard, went to see an iron deposit that an Indian had shown the latter some years previous, near the Little Pic River, about 100 miles to the east of Thunder Bay.

On examination they found that it existed in inexhaustible quantities, so the lands were secured. The ore lies in slightly inclined beds, six to thirty feet in thickness. In one place three beds, one above the other, in the face of a cliff, make an aggregate thickness of 80 to 90 feet. One of the beds shows for about twenty chains along its strike; at the north end, where it is lost in a small lake, it covers about two acres of ground, rising back in hillocks and mounds. The principal part of it lies between fifteen and sixty chains of Lake Superior. The ore is magnetic—each bed being remarkable for its uniform character throughout.

Mr. C. Robb, of the Geological Survey, reported on the property some years ago. He found 46 per cent. of iron in one of the beds, the others yielded about 36. A specimen taken from one of the larger beds by myself when on the Geological Survey yielded Dr. Hunt about 38 per cent. These were all surface specimens, and by the character of the iron it is expected to improve in depth.

I have been told that the present owners, Sibley & Co., who bought it last winter for about \$15,000, had a party working it last summer, and that the ore yielded Prof. Croft 51 per cent. of iron.

THUNDER BAY SILVER MINE.

The next discovery of importance was the Thunder Bay Silver Mine, by myself, on the 20th of September, 1866, about five miles from Prince Arthur's Landing.

At the point of exposure the vein was about 20 feet wide, of quartz, enclosing large masses or belts of the country rock, which were also cut by numerous stringers of veinstone. It was a wonderful show of silver, consisting of native and glance, with some galena, zinc blende, and iron pyrites. The ore occurs in bunches—three to eighteen inches thick by six to forty feet in length—the silver being in strings, leaves, grains, &c., irregularly distributed through the veinstone which constituted the greater part of the bunch. At the first opening there were two of the streaks, one next the north or hanging wall, and one in the middle. It is not well defined, being generally in ribs, with considerable slate between.

The richness of this lode created a good deal of excitement; capitalists and explorers came the following spring in large numbers, and lands were taken up in every direction, but they were soon driven away by that unlucky Mining Bill of Mr. Richards.

In the fall of 1867 Mr. McIntyre of Fort William, and myself, brought two half barrels of the ore to Montreal. A company was formed—Mr. Hopkins, Governor of the Hudson Bay Company, being appointed President. It was divided into 80,000 shares, the par value of each being \$5. Twenty thousand shares were sold for working capital, 60,000 being unassessable. A manager for the mine—Mr. McDonald—was sent for to Europe, and a director appointed in London, England. Even the stamp mill machinery was brought from England, when a great deal better could have been procured on this side.

The mill was erected at the mouth of the Current River, three miles from the mine, on a magnificent water-power. A good waggon road was cut to the mine, and a dock 200 feet long was built into the lake, of cribwork filled with stone. Miners were set to work, two shafts sunk to the depth of 68 feet, 300 feet apart, and the connecting level was partly run. Another shaft was sunk to the depth of about 25 feet to the north-east of No. 2 shaft some 300 feet—in all of which they got silver. The surface between them was partly stoped when the manager was discharged, and another, Mr. McIntosh, put in his place.

He commenced by driving a drift at the ten fathom level north-westward from No. 1 shaft, to find the vein as he expected against the trap that is seen a little back on the hill, although this trap is in the form of a bed, resting horizontally on the slates, at an elevation of about 80 feet above the drift. He also commenced sinking a shaft half way between No. 2 and No. 3 shafts, which he sunk some 35 feet, the rest of the men being employed stoping the ground between the two extreme shafts, a length of 600 feet, in which the silver was found in bunches, as above described.

The vein from the surface down, for 25 to 30 feet, passes through dolomite and chert principally, and was strong and carrying the silver. Below that, as far as they went, it passed through argillaceous strata, in which the vein was found in small stringers, with some galena, &c., but very little

silver. The same condition of things was met with at the Beck or Silver Harbor Mine, but the Thunder Bay Mine showed much more silver.

Had they spent the money in sinking instead of spending it on the surface, it is my firm belief that the mine would be working to this day; for the change in character of the vein in the argillaceous beds is nothing but what might be expected, as it is known that argillaceous strata, by pressure, are liable to expand laterally more than the more solid silicious and dolomitic strata, which, of course, would result in partly or completely closing fissures within them. (See Sir Charles Lyell's "Geology," page 484, on this subject. He states it to be a common phenomenon in mineral veins.)

There seems to me to be no doubt that the vein, if followed down into more solid strata, would resume its original size and character, with a good chance of being much richer as it approached or passed into the Huronian, which I do not think lie over a few hundred feet from surface.

Mr. McIntosh's theory proved a failure; the shaft turned out the same as the others, and the vein or trap was not reached by the drift; so the works were discontinued in the spring of 1869.

The value of the ore raised—which was, according to Mr. Charles Robb's report, 3,294 lbs.—was \$2,592, or an average of \$1,513 per ton.

There is no knowing how much ore had been carried away by the miners and others, but we have good reasons to believe that there had been a good deal. One party left the mine in the middle of the night, crossing Lake Superior in a small boat to Portage Lake, who were said by reliable persons to have brought six or seven kegs of washed silver, which could not have come from any other place at the time. And we know that the manager, by order of the Company, had a large quantity pulverized and washed some time previous.

The property contains over 1,700 acres; and the amount expended is about \$60,000.

SHUNIAH, OR DUNCAN SILVER MINE.

The next discovery of silver was made by Mr. George A. McVicar in May, 1867, in a large spar vein he and Mr. John McKellar had found some time previous—the well known Shuniah Mine, which lies about three miles to the north of Prince Arthur's Landing.

The vein is 20 to 24 feet wide, running nearly east and west, with a vertical dip almost. It is composed of coarse crystalline calc-spar, with a little quartz. There are huge vugs found in it in which are developed immense crystals of dog-tooth spar. Some galena and zinc blende, with considerable iron pyrites, are distributed through the lode—the silver, both native and sulphuret, being usually associated with the blende.

At the first opening the silver was found in small bunches, in the form of leaves and fine strings, penetrating the quartz, spar, blende and galena, in a streak of these minerals which was running along within a couple of feet of the south wall; but in sinking the shaft it was lost about 18 feet down, and again found in the middle of the vein when cross-cutting the lode at the foot of the shaft at the ten fathom level. Here the ores were found in streaks, and bunches around enclosed angular masses of black clay slate.

The surface show of this mine was small compared with that of the Thunder Bay Mine.

Immediately after its discovery, Messrs. McVicar and McKellar entered into an agreement with Withers, Morse & Co. (American Co.), who had arrived there with a surveyor to take up the lands surrounding the Thunder Bay Mine. The Company agreed to work the mine, pay them \$3,000 down, and \$9,000 of the first proceeds of the mine, with an unassessable one-tenth interest each. The Company sent for miners to the South Shore and commenced work immediately, which they continued during the summer and following winter, cross-cutting the lode in several places, and sinking two shafts, one 30 to 40 feet, and the other 60 feet. From the foot of the latter they drove a cross-cut across the lode, finding the silver as above mentioned. Several barrels of ore were taken out and tested, the yield being rather small, or from \$200 to \$300 per ton, as I understood. Twenty to twenty-five thousand dollars were extravagantly spent, and the mine was stopped for want of capital. Prof. E. J. Chapman, of Toronto, reported on it, giving it as his opinion that it would be a paying mine if only followed down deep.

The Company disagreed among themselves, and the original owners had to enter a suit in Chancery against them, which lasted for several years, and was finally settled by the Company paying the expenses and \$5,000, and turning over two mining locations in that vicinity.

In 1870 the mine was sold to James Carson & Co., of New York, for \$75,000, if I remember rightly. Under this Company the mine had been worked until the middle of last summer, sinking the main shaft to the depth of 135 feet, and driving galleries along the lode at the first and second levels, and cross-cutting the lode at several places, one of which was driven to the south for probably 100 feet in expectation of cutting another vein, in which they failed. They got silver in several places in the drifts, which they began to follow up a few days before receiving orders to suspend operations, and had taken out a barrel or two of very rich ore.

The captain of the mine told me himself, after the mine had stopped, that he believed it would about pay its own way now. A good many thousand dollars had been spent by this Company, and that too in the same manner as was done by the Thunder Bay Mining Company, proving and re-proving the surface instead of sinking, as they had been repeatedly advised to do.

I was down in the shaft after they stopped sinking, and the vein in the bottom looked remarkably well. All that was wanted was the silver, and it seemed as though it must come in soon. There was a broad streak charged with the sulphurets of iron, lead and zinc—the first of these being the principal part.

The wall rock is changed in the lower 30 to 40 feet, the silicious and the argillaceous slates holding a considerable reddish chert or jasper, in the form of thin layers and masses generally of a lenticular shape. Above this I noticed a bed of black clay slate, and higher up again towards the surface are the dolomites and dark cherts—it is the same formation as that of the Thunder Bay Mine. The vein is very large all the way down; it is only in the cross-cuts that the north wall could be seen.

The mine was recommenced in November last under a new company and a new name, Duncan's Mine, and we have been hearing favorable reports from it since. Lately I received a letter from Thunder Bay, dated the 18th of December, stating that they had struck a rich streak of silver in the main shaft at 141 feet deep. I know that this information can be relied on.

Latest news from this mine comes in a letter from the correspondent of *The Globe*, dated P. A. Landing, May 24th, 1874, in which he states that he had just been at the Duncan Mine, and that Capt. Nichols told him that they had a streak 16 inches thick of silver ore in No. 3 shaft at the depth of 170 feet, but that they would not follow it up just now, as they had strict orders to continue the shaft on down. He also states that he was shown a piece from it weighing 30 lbs., which the Captain said was only an ordinary specimen, and would yield at least \$5,000 to the ton.

JARVIS ISLAND.

In the winter of 1867 and 1868 the Government placed an annual tax of two cents per acre on all the patented land on Lake Superior, which worked much good, as parties holding much land, and having to pay such heavy tax, set to work to explore and find out its value. The result was the discovery of silver in the Jarvis Island and in the far-famed Silver Islet, which in all probability would still be unknown, and for years to come in the hands of the Montreal Mining Company, as it had been for many years previous.

In the spring of 1868 this Company secured the valuable services of the well known Mr. Thomas Macfarlane, with a party of men, to examine and report on their lands on Lake Superior.

His first explorations were made on the Jarvis Location, situate about 22 miles to the south of Fort William, on which he discovered silver in a large lode of heavy and calcareous spars and quartz, on the island of the same name, which lies one and a half miles off the shore. The island is about twenty chains wide where the vein crosses, a considerable portion being deeply covered with earth. The vein is well defined, eight to ten feet wide, with a dip of about fifty degrees to the east north-east. The silver shows in leaves generally, but also in strings and small nuggets, through the spar, zinc blende, and the black carbonaceous matter. Mr. Macfarlane sunk a shaft about twelve feet deep in the summer of 1869, taking out some fine silver ore. Again in 1870 he followed it down some twenty feet more, taking out a considerable quantity of ore.

This location passed into the hands of the Ontario Mineral Land Company about the 1st of September, 1870, along with the Silver Islet and all the other lands owned by the Montreal Mining Company on Lake Superior.

This Company, in June and July of 1871, employed a small party mining on this lode for a month or two, when they sold it for \$150,000 to Messrs. R. F. McEwen of London, and Simon Mandelbaum of Detroit.

Since then the mine has been worked with considerable energy. The first shaft has been sunk about 100 feet, and two others about seventy feet each, the first thirty to forty feet being an alluvial deposit. The ten fathom level was being driven to connect Nos. 1 and 2 shafts when I was there last winter, and I presume it is through before this.

They drove a winze down below this level thirty-five to forty feet, in which they found a rib of ore resting against the hanging wall. It increased from an inch or so to over a foot in thickness in the thirty-five feet. The ore consists of spar charged with argentiferous zinc blende. I heard it assayed from \$100 to over \$200 per ton. I have no doubt, when followed, it will be found very rich in silver in places. The vein is found to be very large, well defined, and regular. Very little silver was found in driving the drift save the indication—it being seen as a sulphuret coating the blende.

They commenced in the fall, stopping away the ground next No. 1 shaft, and according to the reports they are taking out rich ore. I saw a specimen from it before leaving Fort William in the fall, which was charged with both the glance and native silver. Captain Plummer informed me that he had broken fine specimens of silver out of the lode under the water, on the west side of the island.

The true fissure character of the lode is quite evident by its appearance. Again, it intersects the immense diorite dyke of Silver Island, so that there will be no danger of its giving out, or losing its character by sinking.

A number of good substantial houses were erected in the fall of 1872, and everything is in good working order, with a force of twenty to thirty men at work. On the whole it may be considered a mine of much promise, although it has turned out but little silver for the work done. It belongs to the same class of vein as that of the Silver Islet, which has been proven to a depth of 300 feet already,

and shown to carry the precious metal in such large quantities. They bear in the same direction, carry the same minerals and metals, and intersect the same formation, with the comparison of size being in favor of the former. Even at Silver Islet a good deal of work has been done where it shows very little silver.

Since writing the above I received a letter from Thunder Bay, dated 18th December, stating that Captain Plummer had discovered a rich streak, six inches thick, of silver ore on the foot wall of the vein, in cross cutting the lode at 110 feet down, at the bottom of Macfarlane or No. 1 shaft. I have no doubt this streak will continue up along the footwall to within 40 or 50 feet of the surface, at about the place the ore gave out on the hanging wall in going down—the streak having moved from the one side to the other. It seems that it is much richer than any got near the surface, so the streak appears to improve in depth. It will be remembered that the vein is much wider than the thickness of the shaft, so that a portion of the vein next the foot wall would be unseen all the way down, as the shaft followed the hanging-wall.

Later still: I received in April, by mail, a specimen from Mr. McIntyre, of Fort William. It comes from the foot of the main shaft, 140 feet from the surface, and is very fine; it being charged with silver mostly glance, in the form of leaves, &c. The vein is said to improve in appearance by sinking.

SILVER ISLET MINE.

A month or so after the discovery of the Jarvis, Mr. Macfarlane turned his attention to the Wood's Location, which lies a few miles to the east of Thunder Cape.

During his examination he discovered the Silver Islet Lode, the silver being first noticed by one of the party named Morgan. The Islet was about 75 feet long, rising six to eight feet above the Lake, and lying about half a mile from the main shore.

The vein crosses the Islet in two branches, about 20 feet apart, each 4 to 6 feet wide, bearing about N.N.W. and S.S.E. with a dip nearly vertical. The veinstone consists of calcareous or bitter spar, of a reddish white colour, with some quartz, &c. The rich streak of ore consists of spar, fine grain galena, and occasionally zinc blende. Through the whole, especially the galena, the native silver is more or less thickly disseminated in fine strings, &c., the sulphuret of silver being occasionally present, also small quantities of nickel and cobalt. This streak is two or three inches wide generally, but in places it spreads out to a foot or more. It becomes poor and disappears in places, and again comes in; and in sinking, in some of the layers between two floors it is found to be rich and in others poor. These floors, if I remember rightly, dip at a low angle to the north, and are generally two or three feet apart.

The west branch, or vein that showed the most silver at surface, is the one upon which the work is being carried on. It crossed at the west end of the island, being almost entirely covered by water, though shallow, for 50 feet or more along the lode, so that the men had to work in the water in taking out the ore.

The Islet lies on the above-mentioned dyke of diorite (Macfarlane's band), which is rather coarse in texture away from the walls. A portion running along the middle shows a reddish or brown appearance, owing to the color of the feldspar, the rest being greenish grey in color, with white or greenish white feldspar and dark green hornblende, &c. It differs in appearance from any of the numerous trap dykes I have seen in the country, and is very wide. Here it intersects the slightly inclined bluish or greenish grey shales, which seem to occupy a position near the summit of the Lower Beds of the Upper Copper Rocks.

They succeeded in taking out several hundred weights of the ore, which Mr. Macfarlane brought with him to Montreal in the fall, and had it thoroughly tested, various grades yielding from one thousand to over three thousand dollars per ton.

In the spring of 1869 he resumed his explorations, and did some mining on the Jarvis Island, as above mentioned, and some on Silver Islet. From the latter lode he succeeded in taking out several tons, although the work had to be carried on in from one to three feet of water. Mr. Charles Robb, of the Geological Survey, in his report gives the amount of ore raised in 1869 at 10,791 pounds, or over 5½ tons, valued at \$6,976, giving an average of \$1,292 per ton. They built a house or two on the mainland and one on the Islet, and left a party of seven or eight men to mine and take out timber for cribwork during the winter.

They commenced to sink a shaft on the dry part of the Islet, in the country rock, with the intention of intersecting the lode at the depth of 30 feet, where the water would not trouble them. By the time they had got down about 18 feet a heavy storm came and filled it up, piling the ice high above it, and knocking the floor of the boarding-house through, and nearly carrying the whole thing away, leaving the men in great danger. That put a stop to that work; but some time in February or March the shallow water had frozen solid to the rock, and the miners cut through it and succeeded in taking out, according to their own estimates, about \$25,000 of ore in about a week, when a storm broke it up again.

Mr. Macfarlane was in Montreal during the winter, and made an estimate of the amount necessary to place the mine on a safe footing for carrying on the works, and, as I understood, asked the Company for \$50,000 to do it; but they refused, although the evidences of its richness were so strong.

No doubt, they had the opinion of some pretended mining men who had been in the country, which was to the effect that all these veins would "play out" in sinking 30 feet; people will not be deceived any more by such a theory, as time has shown its simplicity.

The men continued doing what little they could on the Islet on calm days, and taking out timber, etc., until the mine was sold in September following.

In the winter and spring of 1870, Mr. Macfarlane entered into negotiations with American capitalists for the sale of Silver Islet, with the consent of the Company. Captain Wm. B. Frue, of Portage Lake, south shore of Lake Superior, a person of long experience in mining, went with Mr. Macfarlane on the opening of navigation to see it. He was so favorably impressed with its appearance, that he and Mr. A. H. Sibley (above-mentioned capitalists) became very sanguine, but were in danger for some time of being thrown to one side altogether, as the Montreal Company had entered into an agreement with an English Company for all their lands on Lakes Huron and Superior, including Silver Islet. However, the English and American Companies came to an understanding of being equally interested in carrying out the agreement; but when the first day of payment arrived the English Company backed out, and the American stepped in and took the whole, paying \$50,000 in gold on the 1st of September, 1870, the rest in three instalments, making in all \$125,000, the amount of the purchase.

Immediately on closing the bargain, Mr. Sibley telegraphed from Montreal to Capt. Frue, at Houghton, Michigan, who chartered a steamer to transport some thirty men, with the necessary supplies and heavy timber for a breakwater to Silver Islet. Arriving safe, he immediately commenced building the coffer-dam, &c., and by the beginning of October they were enabled to commence mining. Again the works were interrupted for a week or so, in the first part of November, by a storm, which carried away part of the coffer-dam. After all the difficulties they had to contend with, they had shipped ore yielding \$108,000, as stated by Capt. Frue, by the close of navigation. They continued mining, with few interruptions, until a severe storm in the first part of March had carried away nearly half the crib-work, filling the mine with water and ice; but the works were again restored, and mining recommenced some time in May following.

The difficulties Captain Frue had to contend with were very great. The Islet upon which he had to carry on the mining was nothing more than a low rock rising out of Lake Superior over half a mile from shore. The Company owned and employed three strong tugs for carrying the men backwards and forwards to their work, towing rafts of timber across Lake Superior, and cribs and rock from the main shore to the Islet. The latter were brought out on large scows.

The cribs were large, built of heavy square timber, which were made as strong as possible with timber and iron bolts. These cribs being put in place, were filled up some six to ten feet above the water with rock, but the outside cribwork facing the main lake, which is seventy-five feet or more in length, is built up nineteen feet above the water, and filled with fifty thousand tons of rock, according to Mr. Sibley's report. The outside wall slopes or dips into the lake, which, I think, is about sixteen feet deep there, at an angle of about 70° to the horizon. To give an idea of the power of the Lake Superior sea, I will give a few facts:—The large cribs above referred to, when filled with stone and not firmly roofed with timber, would be carried away, the stone having been scooped out by the sea until light enough to be removed bodily. In the fall of 1872, after a heavy storm, Captain Frue showed me on the outside cribwork, at the elevation of nineteen feet above the water, where the sea or spray had scooped the stones away from the front to the depth of two or three feet, and from the appearance it was quite evident that nothing but water could have been the agent. I see by Captain Frue's Report that on the 1st of September last, a heavy storm swept away eight feet deep by sixty feet in length of the top of this crib-work, demolishing the blacksmith's shop that stood forty feet back from the front, and whirled rocks around the Islet like hailstone, damaging a number of buildings. It also tore away nearly 350 feet of submerged cribs.

The mine had to be worked entirely from one surface opening or shaft, which was a great disadvantage, as but few miners could be employed for a long time. The shaft was built of timber, and made water-tight from the solid rock to the height of fifteen to twenty feet above the water, so that the water could not get into the mine even if it should get over the crib-work. From this opening the mine was continually enlarging by sinking and by driving along each way on the lode, taking care to leave a strong backing to prevent the lake from breaking in. By the time they had got down some 80 or 100 feet they had gained distance enough on each side to sink winzes, which would be connected at certain distances, or at each level, by galleries to the main shaft, which was then closed in all the way up. This would purify the air by causing a circulation, and allow them to employ more miners to advantage than they could do when it was all one open cut. On this principle the works have been expanding lengthways on the lode and in depth, and now they are down over 300 feet below the surface of Lake Superior.

When I passed there last fall they had cut a strong vein of water, which at first threatened to fill up the mine, but when they got the new engine to work, as I was told, it was able to keep the water down; but a larger pump is required, which they sent for, but it was frozen in on the south shore, and they will have to wait until navigation opens. However, they are able to carry on the mining in the other parts of the mine, and I see by the last letters from there that it is looking as well as ever.

In the winter of 1871 they drove a cross-cut some thirty feet to cut the east vein, which they said was large and looked very well, but it made too much water, so they had to close it up.

At surface, improvements have been continually going on. They have enlarged the area of the Islet from less than a sixth of an acre to more than two acres, and built ten or twelve good buildings on it. On the main shore they have built extensive docks, a large store, church, school house, and about forty dwelling houses. I suppose the whole population is over three hundred, there being on an average about one hundred and thirty laborers employed on the location.

I have no doubt the value of the product of this mine is greater, for the amount of ground opened, than that of any other mine, but owing to its peculiar situation many mines yield much more annually than it.

The following is the amount given by Charles Robb, Esq., of the Geological Survey: Quantity of ore raised in 1869, 10,791 lbs.; value of same, \$6,976; averaging \$1,292 per ton of 2,000 lbs. Product for 1870, 172,825 lbs. of ore; value of same, \$105,328; showing an average of about 61 cents per pound, or \$1,218 per ton. Product for 1871, 969,454 lbs.; value of same, \$645,397, at a rate of 66½ cents, per pound, or \$1,330 per ton; showing an average yield of a ton and a half per day.

E. Learned (Treasurer), in his report gives the value of product for 1870 and 1871, at \$797,448.68; showing a discrepancy of \$46,723.68 between the two reports. It appears to me that the ore taken out in the winter and summer of 1870 is not accounted for at all.

The following is the Report of Edward Learned, Treasurer of "The Canada Lands Purchase," published by order of the Board of Directors, 30th December, 1872:—

	Gold.
1870, September 19. Paid 1st instalment on purchase of the property of the Montreal Mining Company.....	\$50,000 00
1871, January 1st. Paid 2nd ditto.....	50,000 00
" July 1st, " 3rd ditto.....	50,000 00
" September 30, " 4th ditto.....	75,000 00
" " Interest on above instalments to Montreal Co.	8,303 00
" " Premium on \$183,363, gold, and interest on loans to pay above instalments.....	Currency. 13,846 00
1871 and 1872.	
Paid for smelting silver ores produced from Silver Islet Mine.....	60,116 11
" Canadian Customs on supplies and machinery purchased in the United States.....	3,584 35
" Freight and insurance on ores and supplies.....	36,614 12
" For steam tugs "Ed. Gallagher," "Helen Grace," "Silver Spray," and two large scows...	30,443 01
" For explorations and surveys on different locations.....	4,222 78
" For ½ taxes on property for 1870 (½ being paid by M. M. Co).....	749 22
" For taxes for 1871.....	2,135 56
" For drafts of Superintendent for supplies, labor, etc., on Islet and mainland..	131,662 60
" Premium on gold purchased to pay above drafts and interest on same	11,284 79
" For mining plant, engine, and engine-house, pumps and fixtures on Islet.....	7,066 04
" For boarding-house, office, assorting and change house on Islet.....	4,651 28
" For breakwater, coffer-dam, and shaft on Islet dwellings, boarding-houses, stores, ware-houses, and stables on mainland	22,325 01
" For teams, office furniture, bedding, &c., &c.....	5,245 62
" For harbor, breakwater, building roads, clearing lands, &c.....	14,556 11
" For general expenses, including law fees and legal expenses in Canada and New York.....	21,872 89
" For Wm. B. Frue, on special contract for services	25,000 00
" First dividend.....	166,666 66
" Second dividend.....	96,000 00
Cash on hand.....	69,665 11
Total.....	\$1,022,020 64

DR.

1870, Aug. 27.	
Amount received from shareholders to pay first instalment in gold.....	\$50,000 00
Amount received for working capital, currency.....	23,100 00
1871 and 1872.	
Sales of silver, being product of mine for 1870 and 1871.....	797,448 68
Sales of Jarvis Island property (6,400 acres).....	150,000 00
For interest on same.....	1,471 96
Total.....	\$1,022,020 64

ASSETS.

Cash on hand	66,665 11
Atlantic Mutual Insurance Company's scrip for 1871.....	1,410 00
Atlantic Mutual Insurance Company's scrip for 1872.....	4,950 00
One half the stock and franchise of Montreal Mining Co.....	
16 locations on Lake Superior, containing 94,298 acres.....	

LIABILITIES—NONE.

EXHIBIT OF ACCOUNT FROM FEB. 10TH, 1872, TO DEC. 31ST, 1874, BY THE PRESIDENT OF THE COMPANY.

	11 months, ending Dec. 31, 1872.	12 months, ending Dec. 31, 1873.	Total.
Profit and Loss Sundries.....	\$4,258 75	\$20,240 43	
Silver Account, for Sales of Silver.....	344,199 56	547,556 24	
	348,458 30+	\$567,796 6 =	\$916,254 97
General Operating Expenses.....	107,680 88	149,024 37	
Premium in Currency paid on Gold Drafts.....	14,239 50	25,976 57	
Smelting.....	23,637 24	48,603 65	
Freight on Ore and Silver.....	4,190 66	4,008 54	
Insurance on ".....	3,100 25	5,071 90	
Interest.....	1,772 55	1,846 49	
Surveying Explorations, &c., of Company's Lands.....	1,540 64	282 86	
New York Office, Expense, Salaries, &c.....	1,861 00	9,998 67	
" " Stationery and Printing.....	819 83	208 95	
" " Telegraphs.....	55 96	422 37	
" " Legal Expenses.....	7,186 00	2,020 52	
" " Rev. and Postage Stamps.....	236 17	51 55	
Dividends No. 1 and No. 2.....	180,000 00	180,000 00	
Totals.....	\$346,221 68+	\$427,51 144=	\$773,733 12
Balance.....	\$2,236 62+	\$140,285 23=	\$142,521 85

BALANCE SHEET, DEC. 31, 1873.

ASSETS.

Real Estate and Mines.....	\$5,744,613 12
Wyandotte Silver Smelting Works Stock.....	55,500 00
Mine Equipment and Machinery.....	7,066 04
Building Account.....	79,733 98
Construction Account, Docks, Harbor Breakwaters, &c.....	135,272 10
Tugs Account.....	25,460 73
Burleigh Drill and Air Compressor.....	4,510 66
New Engine and Hoisting Machinery.....	31,811 96
Mine Agent, W. B. Frue, Supplies, &c.....	122,964 66
Insurance Scrip.....	7,990 00
New York Office, Furniture, Safe, Desks, &c.....	1,150 00
Cash in Bank.....	11,735 72
	\$6,227,853 94

LIABILITIES.

Capital Stock.....	\$6,000,000 00
Bills Payable.....	75,000 00
Drafts on Mining Agent in transitu.....	10,337 09
Balance.....	6,085,337 09
	142,521 85

CONDENSED INVENTORY, BY WM. B. FRUE, JANUARY 1ST, 1874.

Real Estate, Mineral and other Lands.....	\$5,744,613 12
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MINING PLANT.

New and Old Hoisting Engines.....	38,241 66
Pumps, Rods, Bob, Wire Rope, Kibbles, and Tools of all Descriptions.....	9,638 41
Engine and Boiler House, &c., including all Buildings on Islet.....	24,973 92
Breakwater, Engine and House Foundations.....	112,345 54
Tugs, Scows, Fixtures.....	25,350 00

\$210,549 53

BUILDINGS.

Cost of Buildings on Mainland.....	\$48,885 54
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DOCKS, HARBOR IMPROVEMENTS, ROAD, &c.

Steamboat Docks, Harbor Breakwater, Lumber Dock and Dry Dock.....	\$23,120 44
Constructing Roads and Clearing Lands.....	4,280 00

\$37,400 44

AVAILABLE ASSETS AS CAPITAL FOR WORKING MINE.

Cash on Hand in Office.....	\$2,988 01
Available Supplies of all kinds on hand.....	55,662 98
Silver Ore on hand, 23,308 tons at \$1,000.....	23,154 00
(The above must mean 23 tons 308 lbs.)	
Wyandotte Silver Smelting Co. Stock, 2,220 Shares at \$25.....	55,500 00
Merchandise in Store at Landing, per inventory.....	45,300 42
	\$182,555 36

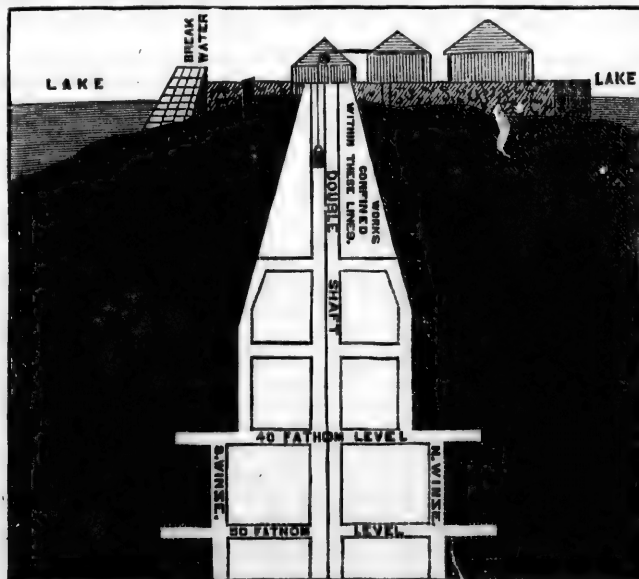
LIABILITIES.

As per Balance Sheet of Ledger, Dec. 31, 1873.....	\$13,408 97
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We can see by the above Reports that the Silver Islet Mine has been a very profitable concern to the promoters—paying a yearly return of about \$2 50 on the \$1 00 from the commencement up to the present. It is true the Jarvis Island brought them in \$150,000, but then the available assets equal more than three times that amount. The total investment was \$73,100, \$50,000 in gold to pay 1st instalment of purchase, and \$23,000 for working capital; after which the mine paid its way, besides paying, in dividends, back to the stockholders \$262,666 66 within a year and a-half of its commencement; and within three years and four months, or up to the 1st of January last, \$622,666 66; which equal an annual rate of interest of 255 per cent. Besides that, according to Captain W. B. Frue's Report, there are 20,000 tons of ore piled on the Islet, yielding \$45 to \$50 per ton, as shewn by tests made at Wyandotte, in quantities of ten tons; and thousands of tons of the same kind are left standing in the mine waiting the erection of the reducing mills—and, of course, as the works progress the quantity will increase. Hitherto none but rich ore, giving an average yield of about \$1,300 per ton, was made available, as the poorer ore would not pay to be shipped to, and treated by, the Wyandotte Smelting Works, as they are intended for the richer ores. Now the value of the above-mentioned 20,000 tons equals \$900,000 by their lowest calculation. We will allow \$10 per ton for reduction, or \$200,000 for the pile, leaving \$700,000; but granting a difference of 10 per cent. in the loss of silver between the two treatments, there would still be over \$600,000 of clear profit, which would swell the dividends to nearly double what they have been. I think the allowance of \$10 per ton for reduction is quite sufficient, for we find by J. Ross Browne, that the average cost per ton for reducing the ores of the same grade on the Combstock Lode was \$12 to \$16; that too seven years ago, when labor and everything else cost more than double what they do on Lake Superior.

Hitherto the expenditure outside of mining has been much greater than it will be in future; as the breakwaters, cribwork, docks, buildings, &c., necessary for carrying on the mine are finished, with the exception of the Reducing Works and a portion of cribwork, the latter not costing over \$25,000, as stated by the President of the Company in his Report, and the former, when in operation, are expected to largely increase the profits of the mine. Captain Frue states that he is satisfied that that mine could be worked with profit by the low-grade ore independent of the packing ore, or that which has produced all the silver up to the present.

The following diagram is a section of the Islet and the underground works conformable with the vein in dip and strike. I have laid it down from the explicit account given by W. B. Frue, of the same, up to the 10th February of the present year:—



SCALE, 120 FEET TO AN INCH.

The above section is intended to give a general idea of the cribwork and the underground work to those who have never been there, and it will be found sufficiently correct for that, although a portion of it is laid down from memory; but the depth of the shaft and the length of the works on the vein, and the height of the breakwater, are taken from the above-mentioned Report. It also shows the short piece of the lode they were enabled to work from the danger of letting the lake water in.

I have been more particular in showing what the mine really has done, as I meet so many who think it is of little importance after all, and that it returns but a small interest to the investors. The Stock is put down at \$6,000,000, and any person buying at that rate would only receive 3 per cent. per annum up to the present. But such would be the result were the mine ten times richer than it is, providing the value of the Stock were increased proportionally. It is the original investors that make the money out of it, as they only paid \$1 for what one would pay about \$80 now, were he buying at par.

Had this mine been on the mainland, and worked under favorable or ordinary circumstances, what a rich mine it would be. Even where it is, with all its disadvantages, it is producing largely, and has been a very profitable mine to the stockholders, and no doubt further developments will show many such mines in this extensive metalliferous section.

MCKELLAR ISLAND SILVER MINE.

The next discovery of importance was made in the spring of 1869, on the McKellar Island Lode, by Messrs. John and Donald McKellar.

The island contains $4\frac{1}{2}$ acres, rising about 80 feet above the lake. It lies about one and a half miles to the south of Pic Island, on "Macfarlane's Band"—(the above mentioned dyke of diorite) about half way between Silver Islet and Jarvis Island. The vein crosses the island near the middle, bearing about north north-west, with a vertical dip nearly.

It is by far the strongest or largest lode known, as far as I am aware, in this N.N.W. system of veins, or in any other system in this locality, it being 45 feet wide, with smooth walls, and I may say free from the country rock. It shows a banded structure, parallel with the walls, and the veinstone is very white, contrasting strongly with the greenish grey diorite. It is composed of heavy and calcareous spars and quartz, with disseminated galena, zinc blende, and iron and copper pyrites, which in places form streaks in which we find silver leaf.

Within a few feet of the vein are branches two to three feet wide, which show much more silver than the surface of the main vein does. On these the principal work has been done. Two or three pits have been sunk six to ten feet deep, from which considerable ore has been taken in sinking. These branches show regular floors about two feet apart, dipping about 40° to the northward. (The same phenomenon was noticed in the Silver Islet Lode.) Some of the layers between these floors were much richer than others, but on the whole they improved with the depth. The silver, which occurs in small nuggets and fine strings when native, and in leaves when a sulphuret, is disseminated through the spar and blende, but more especially through the latter, with which the silver glance seems always present, interlaminated in thin leaves, assays of which show \$600 to the ton. But the blende from one of these branches is thickly penetrated by strings of native silver, which show well upon being ground upon a grindstone. The blende is the principal ore, and is scattered more or less through the veins, but more abundantly along the walls.

An American Company bargained for this mine a year ago last fall, paying some money down on it, but owing to the dull prospects of mining here last summer, when the time of payment arrived they forfeited the amount paid; but since the mines have begun to improve they seem ready to take hold of it again. However, it will not be long before it is worked, as it has all the appearance of being a good and lasting mine, and in a geological point of view, it is precisely the same as the Silver Islet and Jarvis Island mines.

The silver excitement brought many men into the country in the summer of 1869 and summers following, most of whom turned out explorers, who went searching the country for silver veins. The result was, as a rule, that the first vein met with, whether good or bad, on unpurchased land, would be taken up and highly represented to moneyed men who knew little or nothing about mining themselves, and who would invest, thinking they had made a great "strike" by securing such a large mining interest with so small an "outlay." After spending more money in examining and trying to sell the property, the most of them would find out that they had failed in getting a prize after all, and so get disgusted with mining and mines, putting them all down as worthless because they happened to get hold of the wrong thing. Again, false reports have been got on mines, from pretended or unscrupulous mining men, by which companies have been deceived, so that the reputation of this section has suffered very much from these causes up to the present; but the time is at hand when such influences will have no weight with the public, as there will be precedents to show the true and genuine character of this mining region.

SILVER HARBOR, OR BECK SILVER MINE.

The next discovery of silver was the Beck or Silver Harbor Mine in the summer of 1870, by the explorers, Messrs. Ambrose, Syrette and Campbell. It lies at Silver Harbor, on the coast of Thunder Bay, about 14 miles N.E. of Prince Arthur's Landing.

The vein at surface is eight or ten feet wide, enclosing a considerable amount of country rock. It bears about E.N.E. and W.S.W., dipping at a high angle to the N.W., or nearly vertical. The gangue

consists principally of quartz, holding a considerable quantity of iron pyrites, zinc blende, galena, and in places a good deal of silver, some of which occurs native, most being a sulphuret. Some fine specimens of glance were taken out, weighing an ounce or more, and on the whole the show was very fine; and, no doubt, there is more where it came from, if they only follow it up.

The character of this lode is very much like that of the Thunder Bay Mine, and it traverses the same geological formation, and in fact it seems to be in the same silicious and dolomitic bed that we see at the above-mentioned mine, with the same thick bed of trap resting on the slightly inclined slates, immediately to the north-west of it.

It seems to me that this vein must occupy a fissure of considerable extent; for we find that that thick bed of trap and a considerable portion of the slates have been swept away, forming a valley about 100 feet deep along the line of the vein; while the trap on the N.W. side is seen resting as an outlier on the slates, and again, on the S.E. side, it is seen occupying the same position and dipping into the Bay.

This mine was secured and owned by Mr. John Clark, Capt. Symes, and the above-mentioned explorers. The Silver Islet Company and Captain Beck made offers of purchase; that of the latter was accepted, which was something as follows:—Captain John Beck and his Toledo associates paid \$10,000 cash, and bound themselves to spend \$100,000 in developing the property before the others would be called upon for assessments for the one half part, while the original owners retained the remaining portion.

Capt. Beck arrived late in the fall to commence operations. He worked ten to fifteen men all winter, built three or four houses, explored the surface, and sunk a shaft some 40 feet deep. They took out some very fine silver ore, specimens of which are scattered far and wide. The vein showed a considerable quantity of silver in the upper silicious and dolomitic bed, but toward the bottom of the shaft, in the argillaceous beds, it was irregular and poor. So the shaft was discontinued and their attention turned to working the surface bed—the very same course that the Thunder Bay Company, and, I may say, the Shuniah Company followed.

Another manager, Mr. Griffith, was appointed to manage the mine the following winter (1871 and 1872). The same course as that of his predecessor was followed by him in working—that is, driving and sinking in the surface bed. A number of tons of ore were selected and sent below, which turned out but a few dollars per ton, as near as I could get at it; and no wonder, by the way it was assorted. I examined a lot of it myself when in the barrels, and the greater part was very poor, although some was good; but always in a new mine, at least in this country, the richer specimens are distributed by the members of the Company amongst their friends, which shows the mine to disadvantage.

A number of good substantial buildings were erected on the location, and also a good dock, where the largest steamers can lie alongside. In the fall of 1872 the works were suspended, but they will be resumed again without a doubt. The buildings and dock have been used by the 3 A Company ever since, as the stock in the two mines is owned principally by the same parties.

I do not think that they would require to sink deep in this lode to reach the Huronian rock (which no doubt underlies unconformably), as the junction of the two formations lies within half a mile to the north of the vein; for I do not believe that they come together by a great dislocation or fault, as I find in many places that they bear the same relation to each other, in regard to position, as they did at the time these silurian beds were building. My reasons for forming this opinion are drawn from observations in several places of the line of contact, which as a rule is low, and covered with alluvial deposits; as on the Silver Harbor Location, where it lies in a wet tamarac swamp. But along the junction, five or six miles to the west, I have seen many places where the deep cuts in the Huronian slates are filled up by the silurian cherts and dolomites of the vicinity. Had there been a fault, with much depression on the Huronian side, those cuts above mentioned would be filled, if at all, by sedimentary strata belonging to a higher horizon. Again, to the east of 3 A, towards Blende and Silver Lakes, we find the silurian forming deep bays into the Huronian, and, in places, completely surrounding large patches of the latter—at the same time it may, in places, occur in a slight fault, as such is not uncommon in the section.

3 A SILVER MINE.

Some time in the beginning of winter, closing 1870, the rich discovery of silver on the 3 A Lode was made by some of the miners working the Silver Harbor mine.

The 3 A Location adjoins the latter mentioned mine on the north, and was taken, or about being taken up, by that Company at the time of the discovery.

This lode is from eighteen inches to two and a half feet thick, consisting of quartz and spar, through which are irregularly distributed the ores of iron, copper, lead, zinc, nickel, and silver, with some cobalt and gold, as shown by the assays. The silver is found native, and combined with sulphur and nickel; thickly penetrating the veinstone in small and large patches, in some of which it is very heavy—quite as rich as the Silver Islet ore. A mass of this ore, about eighteen inches thick, is to be seen in Hime & Baines' window on King Street, Toronto. The vein strikes about east and west, nearly parallel with, and about a mile to the north of the Silver Harbor vein.

It occurs in the Huronian series, which, in the vicinity, consists of thick beds of diorite and fine grain greenish-grey slates, some of which are chloritic, talcose, calcareous, and ferruginous, with some serpentine alongside of and in the vein. This formation, with which the vein seems to conform, dips

here, and in general at a very high angle, approaching the perpendicular. It is much more ancient than that in which the other mines above described occur. The discovery of the precious ore in these older rocks, which are known to underlie unconformably the horizontal silver-bearing slates of Thunder Bay, should be sufficient evidence to show that the silver does carry down, and is not confined to the surface bed, as supposed by some. Now we have an undeniable proof by practical results, showing the rich silver ore at the depths of 140 feet in the Jarvis, 170 feet in the Shuniah, and 300 feet in the Silver Islet lodes—the three deepest points reached in the North Shore Silver Mines.

During the winter of 1871-2, two miners worked on this lode, carrying the ore taken out in the day time to their boarding-house at the Silver Harbor Mine every night. They sunk a pit some eighteen feet deep, from which they had taken 22 barrels of ore, as they told me themselves a few days after they stopped work, when I was seeing the mine. They showed me part of it, and it was very fine, equally as rich as the Silver Islet ore. I have not been able to find out the actual value of the product; it was bought by Mr. J. S. Lyon, of Buffalo, where he had it reduced by Kayser, James & Co., according to the *Buffalo Courier*. Some of the bars of silver were left on exhibition for some time, then sent to the United States Assay Office in New York, which, according to the Chief Clerk, Mr. J. M. Floyd, yielded \$17.80 of gold to \$301.45 of silver. The amount of silver or nickel, either to the ton or the whole bulk, was not given.

An Act of Incorporation was granted the owners of the 3 A property in March, 1873, the capital stock being placed at \$1,500,000, divided into 100,000 shares at \$25 each. Towards fall in 1872, Captain Slawson, a person of long experience in mining, was appointed manager. He commenced to sink two shafts on the lode, 310 feet apart. By the opening of navigation, No. 1, or W shaft, was sunk to the depth of 77 feet, and No. 2 shaft to the depth of 99 feet: both were discontinued for the want of pumps to keep the water out. In No. 1 shaft they passed through a rich bunch of silver between 40 and 50 feet from the surface. In No. 2 they passed through silver ore at four or five points, as I was told by Captain Slawson, which is corroborated by Prof. Nicholson's report. The Captain showed me a box of ore taken from the two shafts, which was very rich, showing the gangue thickly penetrated all through, as well as a large quantity of nickel, in the most of them. He told me he had sent a box of specimens to the Company; the result of which will be seen by the following extract from the *Buffalo Courier*:—"Soon after taking charge he (Captain Slawson) forwarded by the first messenger to Mr. George Truscott, the Vice-President of the Company, a box of ore from 3 A. A sample of this was promptly sent to the Assay Office of the Wyandotte Silver Smelting and Refining Company, and the report upon the same was received here yesterday. The Superintendent, W. A. Courtis, and the Assayer, J. B. Cleveland, certify officially that the assay shows a yield of 2,465.7-10 ounces fine silver to the ton of 2,000 lbs., the coin value of which is \$3,205.41. The assay shows 1.4-100ths per cent. of cobalt, and twenty-five per cent. of nickel, a valuable metal.

"In the Superintendent's letter to Mr. Truscott, he says:—'As you see from this assay, ore of this kind would be very valuable; though the nickel would make the separation of the silver more difficult, it would add to the value of the ore from 50 cents to 70 cents per pound of nickel contained less freight on matter to New York.'"

The quantity of ore taken out during the winter was small; however, much could not be expected in a vein where the ore makes in bunches like this, as they had to follow the shafts right straight down, therefore were unable to follow a streak of ore to the one side or the other; and the chances were as much in favor of passing through the tail end as through the middle of a bunch. It is never expected in the native copper mines of the South Shore belonging to this class, or those showing the ore irregularly distributed in heavy bunches—such as the Minnesota, Cliff, Ridge, &c., to pay the expense of sinking or anything like it. I often heard it said of the Minnesota Mine, that they seldom struck copper in sinking the shafts, although so rich. It has paid \$1,750,000 dividends upon an investment of \$436,000.

Allowing the 3 A to be a rich paying mine when thoroughly opened out, it could not be expected to pay dividends, if systematically worked, until two or three shafts were down two to three hundred feet, with the connecting galleries driven at each level of 60 feet. Then a large force could be employed stoping out the bunches of ore, which seem to be rather plenty, also large, judging by the quantity taken out of the first, while the barren ground would be left standing. Again, the same amount of vein can be removed by stoping for about one quarter the money it would take to do it by sinking.

The stockholders and public at large were very much disappointed by the result of the winter's mining, as they were expecting a large shipment in the spring, by reason of its being too highly represented in the first place—their calculations having been based, no doubt, on the lode being equally as rich throughout its length and depth as it was in the first pit or bunch.

Captain Slawson being indisposed, left the mine in the spring.

We have no account of the ore taken out during the winter, but there must have been a barrel or two at least.

Soon afterwards Captain Tallon took charge, and the works were again resumed with vigor. He seems to be a man of experience, caution and sound judgment. I visited the mine in August; the two main shafts were nearly filled with water, but they were mining in the old pit sunk in the winter of 1871, which lies 30 to 40 feet east of No. 2 shaft, from which very fine ore of silver was being taken out at the time. There was but a small force employed then, which by the close of navigation had been increased to the number of 32 men. Seven barrels of ore were taken out and sent to Wyandotte

Smelting Works in the fall, which is said to be worth \$500 to \$600 per barrel. I have been informed by Mr. John Clark, of this city, one of the principal stockholders in the Company, that they are expecting the returns of the ore every day. We are informed by all the letters from Thunder Bay that they have been barrelling up at least one barrel of ore a week since navigation closed.

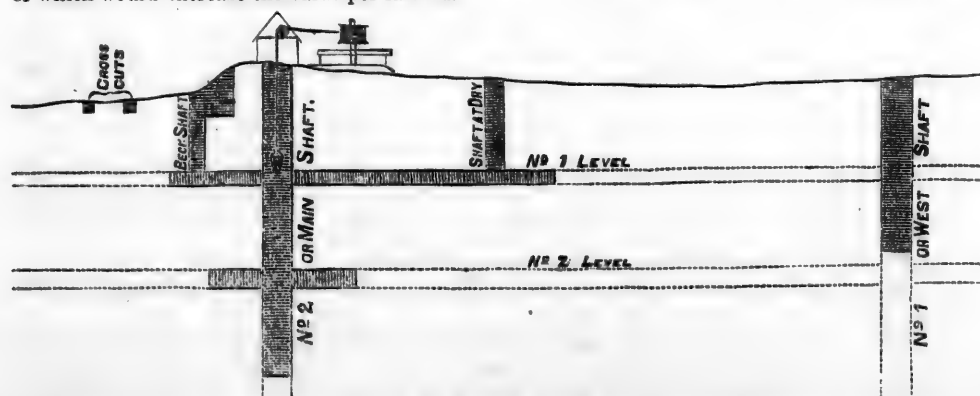
The correspondent of *The Globe*, in his letter dated the 20th of December, states that he had been at the mine that week, and that they had six barrels filled then, and a splendid show of ore in sight; so I expect they would have about eight barrels by the close of the year. In this letter it is stated that one party was drifting from the main shaft, at the depth of 26 feet; another party at the depth of 40 feet. I think the latter party must have been working in the first level, which is 50 feet from surface, as shown on a plan or section of the mine made by Captain Tallon, 26th November, which was kindly lent me by Mr. Clark. Already it seems that the mine is about paying its way. Allowing the product at a barrel of ore a week, valued at \$400 per barrel, would be a yield of over \$1,600 per month, which should about cover the present running expenses.

These results from the mine at its present stage I consider very satisfactory. I do not suppose that there is any mining man who knows the formation in which it lies, and has any geological knowledge of formations, but will allow that the chances are in favor of its improving in depth, as we know it is not a short fissure or gash, it having been traced for over 30 chains on the location as well as across 4 A on the west, as I understand; and I saw by the last letter in *The Globe* from that locality, that the twelve men who have commenced work on 4 A had cleared away the earth from the surface of the vein, which is said to be $3\frac{1}{2}$ feet wide, and were ready to commence sinking. But allowing that the 3 A vein should not improve or disimprove, but continue the same ratio between the ore and the vein it has done up to the present, there is no doubt it will be a good paying mine when further developed. Let us make a rough estimate of the value of the ore taken out, and the amount of ground worked, to see how they compare. We will allow the size of the shafts to be 6 feet by 12, the drifts and the winzes 6 feet by 6.

	Solid fathoms.
Beck's Shaft or Pit of 1871, a depth of 18 feet.....	9
No. 1 Shaft, a depth of 78 feet.....	26
No. 2 Shaft, a depth of 101 feet.....	33
Winze connecting Beck's pit with first level, a depth of about 42 feet.....	7
Drift E. from No. 1 and No. 2 shafts in first level, 65 feet.....	11
Drift W. from No. 1 shaft in first level, 62 feet.....	10
Drift E. & W. from No. 1 shaft in first level, 6 feet.....	1
.....	—
About the number of solid fathoms worked up to 4th Jan., 1874.....	100
Allowing the 22 barrels taken out in 1871, for which \$2,200 were paid for at the Mine, along with the ore given away otherwise.....	\$3,000 00
The ore taken out by Captain Slawson.....	1,000 00
The seven barrels sent down last fall.....	2,500 00
The ore taken out from the close of navigation up to the fourth of January at eight barrels.....	3,000 00

Total value of product would equal..... \$9,500 00

which I do not think is far out of the way; besides, there have been a great many rich specimens given away. There is one in Toronto now which weighs 150 lbs. These estimates would show an average of \$95 to the solid fathom of ground; besides there is a great deal of ore left at the mine which could be worked with reducing mills on the spot, though considered too poor to send to Wyandotte. And when the mine is ready for stoping, the barren ground will be left standing, and the ore could be taken out, as it is confined within two or three feet, without stoping the whole width of six feet, all of which would increase the value per fathom.



SECTION OF 3 A MINE—SCALE 90 FEET TO AN INCH, FROM CAPT. TALLON'S LETTERS AND SKETCH, UP TO MARCH, 1874.

Mr. Murdoch and party, of the C. P. R. R. Survey, who left Thunder Bay on the 16th of May, arrived in Toronto a few days ago. They state that 3 A is looking remarkably well.

I see by a letter in *The Globe* of to-day (25th May) from its own correspondent, who had his information from the Captain of this mine, that the shaft was down 150 feet, and all the force employed in sinking, and that the vein looked very well in the bottom, and that they would have twenty to twenty-five barrels of silver to ship in the spring, besides having at the mine a large quantity of lower grade ore. Now it will be seen that the mine has turned out fully as well as was expected in the first part of the winter—by reference to the first part of this paper on the mine, which was written in the beginning of February—that is, one barrel per week. There was not over two barrels of ore taken out of the mine the winter before last although the force employed was nearly as large as that of last winter, which shows an improvement of the product, in a year, of about 12 to 1, and it may be expected to increase according to the development. Besides the rich ore they barrel up at present, it must be remembered there are large quantities of lower grade ore being taken out, that are likely to swell the value of the product immensely when they have Reducing Mills on the ground.

CORNISH SILVER MINE.

The Cornish mine, which lies about two and a half miles to the north-west of the 3 A, was discovered about two years ago by two Cornish miners. From personal knowledge I can say nothing of the lode, as I never examined it. It traverses the Huronian rocks, and I understand it is large, well defined, and carries considerable galena, zinc blende, and iron pyrites. Rich specimens of silver ore, said to come from it, resembling that of the Beck mine, were exhibited over the country the summer and winter following.

The company was organized last winter by Messrs. John Shore, Assayer, and Peter Body, Mining Captain, both of Prince Arthur's landing, who, as well as Mr. McDermid, Assayer for the Silver Islet Company, wrote reports showing it to be very rich in the ores of silver.

Active operations were commenced early in the spring of 1873, which have been steadily continued up to the present; but, as far as I could learn, it failed, up to the close of navigation, to prove the existence of the silver as represented in the reports. However, by the opening of spring the truth will be known, as they are working a force of about twenty-seven men this winter.

This is the only real Canadian Company that is engaged in extensive mining on Lake Superior, it being composed principally of Ontario men.

The above article on this mine was published in *The Globe* last February; since then, I have received information from Thunder Bay to the effect that the mine had suspended operations altogether, and it is nothing but what I expected from the beginning.

THOMPSON ISLAND SILVER MINE.

The Thompson Island lies on Macfarlane's Band, between McKellar Island and Spar Island. It was located by Mr. Thomas Macfarlane, for the Montreal Mining Company, in the summer of 1869, simply because it was on the above mentioned band or dyke of diorite, with veins passing through it, which showed no silver as far as his examination went, but for reasons given in the first part of this paper he suspected its presence, which would only require mining to find.

The patent was not issued until some time after the sale of the Montreal Company's lands, which caused a dispute to arise between the two Companies as to the ownership, which was finally settled by each holding half the stock.

Mr. Alexander Mackenzie, with a party of five or six men, was appointed to examine the island last summer. He succeeded in finding silver in a large spar lode, which bears about N. N. W., the silver being finely disseminated in minute particles or strings, when native, and in thin leaves when combined with sulphur. They are sinking on the vein this winter, and I see by the last reports that they still continue finding the silver. This information is reliable, as it comes from Capt. John Plummer, of the Jarvis Island, in a letter dated some time in January to his father, Mr. Plummer, of this city, who kindly showed it to me. It also confirmed the report previously mentioned in this paper, of their having cut a streak, carrying native and silver glance, on the foot-wall, at the depth of 110 feet in the Jarvis Mine.

SILVER LAKE MINE.

This property consists of three locations—No. 1, No. 2, and No. 3—bordering Silver Lake, in the township of Mactavish, on the east, south, and west. It contains deposits of iron, lead, and copper, which were discovered by Mr. Donald McKellar and myself in the summer of 1865. Shortly after, it was purchased, but no further attention was paid to it, owing to its lying about five miles back from Thunder Bay, until Prof. Nicholson and Dr. Ellis of Toronto went to see it last summer, each of whom expressed a high approval of the deposits, more especially of the iron. The former of these gentlemen entered into an agreement with the owners (Mr. J. McIntyre, the heirs of Mr. T. W. Herrick, and myself) for the purpose of developing the property and organizing a Company, and now work is being commenced.

About thirty chains west of the Lake, on No. 1 Location, covering some 30 or more acres, lies the iron, intermixed and interstratified with silicious and argillaceous rock, which occupy a position near the base of the Lower Beds of the Upper Copper Rocks. The ferruginous strata is probably 200 feet

or more in thickness, dipping at a low angle south eastward, some of which is very pure ore, as shown by Prof. Nicholson in his report of the property in which he gives the analyses of the ore by Prof. Croft and Dr. Ellis at 68.88 and 69 per cent. of metallic iron; leaving therefore but about 1 per cent. for foreign matter—it being the hematite ore, it can contain no more than 70 per cent. of iron. Owing to the overlying soil and thick growth of timber, it is impossible to form a correct estimate of the quantity of ore until it is developed to some extent.

There are large veins of quartz and spar, carrying a considerable galena, passing through the three locations. The richest exposures are to be seen on No. 2, where the ore shows in ribs 2 to 18 inches in thickness in two parallel veins, which are separate some 5 chains. The one is about 3 feet wide and the other 10 or 12 feet, bearing nearly east and west, and dipping at a high angle to the north. This ore yielded Dr. Ellis 66 per cent. of lead.

The principal copper lode intersects No. 3 Location, bearing about E.N.E. The metalliferous belt seems to be composed of slightly altered country rock (indurated marl), which is penetrated by considerable quantities of the pyrites and carbonate of copper, in strings and irregular masses, with small quantities of spar and quartz.

I have no doubt but these veins may be found rich in the precious metals by sinking, as what appears to be the same run of ore, in the same formation known now as the "Enterprise Mine" near Black Bay, yields \$21 to the ton of gold and silver, as shown by Prof. E. J. Chapman. These lodes will be found persistent in depth as they occupy true fissures, for the principal one runs in the line of a great fault, which increases in its westward course, as the indurated marl is seen to lie in an almost horizontal position, and occupy the country to the north alongside of the vein, all through this property and for several miles further west, while on the south side in going west, the indurated marls are succeeded by the sandstones and conglomerates, then by the argillaceous, silicious, ferruginous, dolomitic, &c., strata of the Lower Beds, and then by the Huronian series, which comes to surface near the western boundary of the property.

GOLD MINING ON LAKE SUPERIOR.

Previous to the summer of 1871 free gold was not known to exist on the north shore of Lake Superior, in Canadian territory; yet the pyrites of copper and iron were shown by assay to be auriferous in several places, as in the Prince's Bay Location, L.C., Black Black 3 A Mine, and in other places.

The general characteristics of the Huronian slates of Lake Superior resemble those of the most gold-bearing formations of the world so much that I invariably looked for gold whenever I came across veins in them, but always failed until the summer above mentioned.

JACKFISH LAKE GOLD MINE.

The excitement caused by the Silver Mines of Thunder Bay spread amongst the Indians, who also began to look for metalliferous veins, by bringing specimens from every white rock they met with. Two of these, J. Baptist and M. Puchat, who were in the employ of the H. B. Co., under Mr. Neil Whyte of the Beau Blanc Post, broke some specimens along the trail on their way home from Fort William, one of which showed the ores of lead, copper and iron, which are very common in the veins near the coast, but not in the old rocks back. Mr. Whyte sent the specimens to Fort William in the winter of 1870-71 to show them to me, to see if they were of any value.

Mr. John McIntyre, of Fort William, got the Indians to bring in more specimens, and some of the wall rock, which was talcose slate. From the appearance of the vein-stone and slate I felt confident that the vein did carry gold, although the specimens did not shew any; so Mr. McIntyre sent two of the Indians along with me to show it. We started in July, 1872, following the Dawson route a distance of 45 miles, to Lake Shebandowan, where we procured a canoe and provisions for the rest of the journey, which was 80 miles by water, to bring us to the west end of the lake; then, according to the Indians' calculations, 25 miles to the vein, by portages, small lakes, and streams; which afterwards proved to be only 12½ miles when the road was cut out and measured.

On reaching the place I commenced my examination, and was soon rewarded by finding the free gold in the form of thin leaves coating the bitter spar. At the point of exposure the lode is running along in the face of a steep hill, and large blocks of the vein rock had fallen down, making it appear to the Indians to be running at right angles to its real course; therefore they were unable to trace it up or find it in any other place. Before leaving for Thunder Bay I traced the vein by its outcrops for about three quarters of a mile, finding it of similar character throughout.

On our return Messrs. McIntyre, Whyte and myself agreed to take the late Mr. Thomas W. Herrick in with us, he being a P. L. Surveyor, and associated with us in other mining locations. The Indians were to have an undivided one-third interest in the first location, free of all expenses.

Some time in August Mr. Herrick and myself, with a party of men, left Fort William to survey the lands. While the survey was going on I was engaged in the examination of the lode and the rock formations of the locality.

The surrounding country is covered with the usual timber found on the high lands, such as tamarack, spruce, small pine, poplar, and birch, which in general are small, though occasional patches of large timber are met with. The flat mossy tamarack swamps that prevail in this section are surrounded by low rocky and sandy ridges, which seldom rise above an elevation of 200 feet.

The rock formation consists of the usually fine-textured greenish slates of the Huronian series—such as dioritic, chloritic, talcose, silicious, and fine grain micaceous slates, interstratified with beds of massive diorite, and an occasional bed of ferruginous quartz and magnetic iron ore. These magnetic beds are from 20 to 150 feet in width, and show a ribbon-like structure, being interlaminated with layers of quartz, and can be traced for miles along their strike; no doubt the time will come when some of them can be worked with profit.

The rock on either side of the lode for some distance is composed of the greenish slates, talcose, chloritic, and dioritic, with the massive diorite and iron ore beds; while resting on these, to the north-west of the lode about a mile, is a great thickness of the above-mentioned micaceous slates, which are dark in color, and in places pass into clay slate, showing a transverse cleavage. These are out in every direction by masses or irregular veins of quartz, which appear to belong to the gash-vein system. Again, to the south-east, some two miles beyond the vein, are developed great thicknesses of greenish-white, silicious, slate conglomerates. The whole of these slates seem to lie conformably on one another, dipping to the N. W., at an angle of 50° to 80° .

About three-fourths of a mile to the N.E. of the vein lies the Jackfish Lake, which is over a mile and a half in length. Its bed is worn out of massive reddish granite which must have been forced up through the above-mentioned slaty strata, as we find them displaced and altered in appearance next it. In coming from the S.W., we find that the slates within half a mile of the Lake change in their strike from E.N.E. around to the N., and then to the N.N.W., the angle of dip increasing with the change of strike from 50° until it has reached the vertical, then after passing the broadest part of the granite, west of the Lake they again change and gradually gain their original dip and strike. To the south-east side of the granite and Lake, the change in the strike of the slates is but slight, but their dip becomes nearly vertical; besides, they are changed into a sort of gneiss for some distance from the granite.

The general width of this igneous belt of rock is one-half to three-fourths of a mile. It extends north-eastward for many miles, intersecting the strike of the slates at a small angle. On Jackfish Lake, where it terminates abruptly in its westward course, with the exception of the small branches it sends forth, it spreads out to a mile and one-half in width. These branches cut the slates in all directions near the Lake; but the most of them at no great distance seem to fall in and follow the cleavage plains of the slates, and they are seen to continue for several miles from their nucleus, as it were.

The vein may be said to consist of two ribs or bands of quartz, each averaging from 1 to 3 feet in thickness, with a parting of talcose slate of 2 to 4 feet in thickness, making in all a width of 7 or 8 feet. The slaty parting is filled with crystals of iron pyrites, and carry some gold, but whether in paying quantities or not I could not say. The quartz and associated bitter spar make an aggregate thickness of $2\frac{1}{2}$ to 4 feet; all of which are charged with galena and copper, and iron pyrites, with some zinc blende, gold, sulphide of silver and tellurium. The latter two occur through the quartz in bunches, consisting of an arborescent nucleus of the malleable ore, around which, from one to several inches, the quartz are rendered very dark from the presence of thin leaves and minute particles of the silver ore. Nuggets and leaves of gold are almost invariably found in these branches, and the tellurium contains about \$80 of gold to the ton; as shown by Dr. Ellis, of the School of Technology. The gold is also found in leaves coating the bitter spar, and in small nuggets penetrating the quartz, galena, zinc blende, copper and iron pyrites. It seems to be present in more or less quantities throughout the whole lode, as shown by many trials both by the fire assay and the simple way, crushing, roasting and washing.

It may give you a better idea of the value of this lode when I tell you that Captain W. B. Frue, of Silver Islet, and associates, paid \$20,000 for less than a half interest, on the strength of the specimens and the description I had given of it. When Capt. Frue himself examined it the following winter he said it was even better than it was represented; and at the time they bought, they knew it was on Indian territory, and that there was a strong party trying to overthrow our claim by getting up false maps, &c.

In January, 1872, we had a house built at the mine; then Captain Frue sent out five miners, who worked until the latter part of March, cross-cutting and sinking on the lode. They blasted out about 100 tons of ore, which is lying on the bank; 126 lbs. of it were sent to Wyandotte. We got some very rich specimens of gold out of the bottom. We also had a road grubbed ten feet wide, between Shebandowan and the mine.

The Indian Chief Blackstone arrived at the mine a few days after the miners had run away to Thunder Bay, and he ordered us all to leave until the Government would settle with the Indians, for he said if we were to stop that hundreds of white people would go right into their country and take up their land; then the Government would not settle with them, and it would create trouble between the Indian and the white man. We were all to leave the next day anyhow, except two men to take care of the place until after the break up in the spring, as the miners had run away. So I told the Chief if he would promise that everything left would be safe, which he did, we would go.

The result of the 126 lbs. of ore sent to the Wyandotte Smelting Works, was an average of \$500 to the ton, about \$40 of silver, the rest of gold. The button of gold produced, which weighs some two ounces or more, is in the possession of Mrs. J. McIntyre, of Fort William, to whom it was presented by Captain Wm. B. Frue. We do not expect that the average of the ore will equal the above result,

unless the mine improves much in depth. We could scarcely expect such a large average when the ore is there in such large quantities. Take the mines on the great Combatoek Lode, Nevada, which have paid millions of dollars in dividends, and the average yield of them was from \$20 to \$46 per ton.

It may seem strange to those unacquainted with mining how those low grade ore mines can be worked with profit, when mines yielding from \$1,000 to \$2,000 per ton are only ordinary mines. The simple reason is this—that whenever ore yields an amount greater than the expense of mining and reducing, as long as there is plenty of it the mine can be worked with profit, which will increase in proportion to the amount annually worked, and the percentage of the ore over and above the cost of working. The expense of working a ton of ore in different mines varies from three dollars to thousands, this great difference being due principally to the amount of waste ground that is required to be removed in procuring the ton of ore.

Having thoroughly examined the outcrops of the lode in question for about three-quarters of a mile along its strike, and having been there when being cross-cutted in several places, from one of which about 100 tons of ore were taken, and judging from the character of the lode throughout, I am satisfied that there will be no lack of ore, as the whole of the quartz seems to be more or less auriferous, therefore can be cheaply worked, or in other words, at a low rate per ton; so that it could be worked with profit at a small fraction of the yield of the sample sent to Wyandotte, say \$50, or \$20, or even less per ton when we know that ore can be mined and reduced at a much lower figure, where labor and supplies are much more expensive, than with us.

Take, for example, the above-mentioned mines on the Combatoek Lode, Nevada. According to Mr. J. Ross Browne's official report to the United States, the total expense per ton of working the ore and extracting the silver and gold in the principal mines on this lode was \$22 to \$23, and that too when miners received on an average \$4 per day and everything else in proportion, which was more than double the price paid on Lake Superior. He also stated that private companies having mills of their own were enabled to work mines yielding only \$15 per ton. Again, take the Black Hill Mine in Australia, the ore of which could not have cost \$3 per ton for mining and reducing, as shown by Mr. A. R. C. Selwyn, Director of the Geological Survey (see page 281 of the Geological Report of Progress for 1870-71). He states that the average yield of the ore from this mine was only 2 dwts. 21.21-100 grains of gold per ton, yet it paid the proprietors 10 per cent. on the capital invested.

Besides the precious metals in the Jackfish Lake Lode, the ore consists largely of galena, with considerable copper pyrites. The galena especially could be saved, and I have no doubt it would pay the total expense of working the ore.

In reference to the character of the lode, I am satisfied that it is all right to a much greater depth than we can go. In the first place, I believe it to be a true fissure vein. Although it seems, from an examination of one point only, to conform in dip and strike with the formation, it does not; for I find that one of the large magnetic beds lies about 600 feet to the south-east of the north-easterly exposure of the vein, while the two come within 100 feet of each other at the south-westerly exposure, where the vein is lost in low land; in the next place, it and the bedded lodes, which are numerous, are distinctly different in character as well as in the ores they bear, the latter being finely granular schistose, and holding magnetic ore. It differs also from those of what appear to be the gash-vein system which prevails in the above-mentioned fine, micaceous strata, in being persistent in its course for a long way, in being rare in the locality and also in the ores it carries, and in its quartz being less transparent and vitreous.

Again, the veinstone is identical in character, as well as in the ores it contains, with that of the Heron Bay lodes, one of which runs with the stratification and the other across it at right angles, of which I will give a brief description further on.

For a vein to run with the cleavage or stratification is no proof against its occupying a true fissure, as is generally believed, for the direction of a fissure depends on the way the forces that caused it were applied, which would be more likely to be exerted along the line of bedding, the way it had previously been when folding or tilting the strata in the way we find it.

But allowing that it did not occupy a true fissure, the surface characteristics of the lode and of the enclosing formation show clearly that it is sufficiently extensive in depth for all practical mining purposes.

I have been more particular in describing this vein, by reason of its being further developed than any of its kind in the section. Besides, if we can show, as I believe we have, that there is one good gold-bearing lode in this locality, we can safely calculate on the existence of others where there is such a large tract of unexplored country lying on the same formation.

Explorations ceased almost entirely on the Height of Land in the spring following the above mentioned discovery, for the following reasons:—In the first place, the Indians objected on the ground of not having been settled with for the land. In the next place, the policy of the Government was such that no person could see the way clear for securing a piece of land were he to make a discovery ever so valuable. But now that the Indians have been settled with, it is to be hoped that a liberal policy will be adopted there, such as we enjoy along the shore of Lake Superior.

PARTRIDGE LAKE GOLD MINE.

In the spring of 1872 an Indian (Nanabin) brought specimens of quartz which he had met with in his travels in the interior to Mr. J. McIntyre, of Fort William, some of which contained copper and iron pyrites. The appearance of the specimens, along with the character of the enclosing formation of which he had a sample, were considered sufficient indications of the presence of gold to justify making a trip to the place for further examination. So Mr. Archie McKellar, with the above mentioned Indian, left Thunder Bay soon after, following the Dawson Route as far as Mille Lac, thence westward by small lakes and portages some 25 miles to Partridge Lake, where the Indian showed him the vein. Mr. McKellar was not there long when he discovered a small nugget of gold in the quartz, after which he got many of the same kind. Then he traced the vein by the outcrops for a mile along its strike, without any apparent diminution of size. It disappeared in a lake at the one end, and in low land at the other.

It seems to run along in a broad band (half a mile or more in width), of fine-textured dark and greenish-grey slates, which seem to consist of talcose, chloritic, silicious and porphyritic slates, which are cut occasionally by small granite veins. These strata dip at a high angle to the north-west, and are enclosed on the one side by reddish granite, and on the other by a peculiar semi-crystalline porphyritic rock. The relation of these rocks to one another has not been traced out.

The vein seems to be very large, averaging from 6 to 14 feet in width, composed of vitreous quartz, with an occasional thin parting of soft talcose slate. The quartz is partly stained red by the oxide of iron, and blue and green by the carbonate of copper. It seems to be sprinkled, as it were, all over with copper and iron pyrites and small particles of gold. The latter seems to be so evenly distributed through the veinstone that there is little room for choosing in selecting specimens. A fragment of the vein, weighing from 80 to 90 lbs., was sent to Montreal, along with other specimens from another part of the vein three-quarters of a mile off. The assays by Dr. Girdwood, of Montreal, yielded from \$27 to \$30 to the ton, there being but a dollar or so difference in the yield of the two places. The gold is very easily extracted, as it seems to be free through the quartz. I have tried many samples of the rock where the gold could not be seen with the eye, by simply crushing in a mortar, roasting over the fire, and washing, and it never failed to yield a considerable quantity of gold dust.

The fact of the gold being so evenly distributed through the quartz, and the quartz being in such large quantities, are I believe sufficient evidence, although only \$27 to \$30 per ton, to show that this is a valuable mine. The above description of the lode, formations, &c., are given as received from the discoverer of the gold, who had taken specimens and geological notes when there, and can be depended upon. I may state that this vein is distinctly different in character from the Jackfish Lake gold lode. Being on Indian territory, no work has been done on it since.

HERON BAY GOLD AND SILVER MINE.

Sometime during the summer of 1872, Messrs. W. Pritchard, J. McLauren, and A. or P. Syrette, explorers, and all of Fort William, were prospecting near the Pic River, which lies over 150 miles to the N.E. of Fort William, and discovered two veins of quartz near Heron Bay, carrying considerable galena, zinc blende, iron and copper pyrites, also gold and silver, as proven by the assays made by Mr. McDermid, of Silver Islet. It lies in the talcose and chloritic slates of the Huronian series which occupy the coast of Lake Superior for ten or twelve miles, and runs back towards White Lake some 50 miles or more. I have not seen the veins myself, but I will give their character, &c., as near as I could gather from those who have.

The veins lie within a mile or so of the Bay; at the surface their widths vary from one to four feet, composed of vitreous quartz with some bitter spar; all the specimens I saw from it were charged with the above mentioned ores. One of these veins seems to conform in dip and strike with the slates, which strike about E.N.E., with a dip nearly vertical.

The other bears nearly N. and S., intersecting the slates. Upon this a shaft was sunk some 40 feet last winter. The lode is said to be much wider at the bottom and richer in ore than at the surface, it having opened out to 5 or 6 feet.

The above mentioned explorers, after the discovery, brought specimens to Capt. Frue, of Silver Islet, who got them assayed by Mr. McDermid, which yielded, as above mentioned, gold and silver, averaging, as I was told by the assayer, about \$70 of each.

Then Capt. Frue and Mr. Sibley entered into an agreement with those explorers, which was something as follows:—The former party agreed to purchase the lands and test and work the lodes, or sell them to the best advantage for a two-thirds interest, while the discoverers retained the other one-third.

A party of men were employed sinking on one of the above, as mentioned, last winter, and I expect the work will again be resumed the coming summer, as I see that Mr. Sibley has applied to the Government for an Act of Incorporation.

I may mention, in conclusion, that the general characteristics of these veins in regard to the veinstone and the ores it bears, and also of the enclosing formation, are precisely the same as those of Jackfish Lake gold lode and formation—the specimens can scarcely be detected one from the other. I did

not see any specimens of the Heron Bay ore where the gold or the sulphuret of silver was discernible to the eye, but I understand that they did find some.

I noticed in going up the Pic River some years ago a large patch of granite, similar in appearance to that above mentioned as occurring on Jackfish Lake near the gold mine. It is enclosed within the slates, and lies within about a mile or two of the Heron Bay lodes. It must have terminated between the river and the lake shore, near Heron Bay, as I examined the coast and could not find it pass on. Not having seen its line of contact, I am unable to say what relations it bears to the slates, but I have no doubt it is intrusive. Having seen the granite in about the same position in regard to each of these gold-bearing lodes, which lie about 150 miles apart, I thought it worthy of mention, as it may or may not have something to do with the presence of the precious metals in these veins.

KASHABOWIE AND SHEBANDOWAN GOLD LODES.

Since the discovery of gold at Jackfish Lake, there have been many lodes of quartz found on this side of the Height of Land in the vicinity of Kashabowie and Shebandowan Lakes, which are said to yield by fire assay from a few dollars up to \$100 or more per ton, but as far as I am aware, none of them show the free gold and, with one or two exceptions, the galena, zinc blende, and silver ore are wanting. These, as yet, are totally undeveloped, but in all probability some of them will be good.

PACIFIC R. R. TERMINUS ON LAKE SUPERIOR.

We know that these metalliferous slates occupy a large portion of the country from Thunder Bay westward, between the American boundary and the Dawson Route, extending in a few places to the north of the latter in broad belts, and we know that on the American side of the line, in Minnesota, in this same formation, near where it crosses, have been discovered large deposits of iron, which will soon be made available, as they commenced last summer to build a railway from Lake Superior to tap them, so that we may look for similar deposits on our side. Therefore from this and the results of the partial explorations already made—of which I have given a short account in this paper—we must conclude that the metalliferous wealth locked up in this extensive tract must be very great between gold, silver, lead and iron. Now, in order to explore and work it to advantage, it would be necessary to have a railway connection between Lake Superior and the chain of water courses on the Height of Land which penetrates the above-mentioned tract in all directions in the form of lakes and streams, otherwise none but rich mines of the precious metals could be worked, iron mines being out of the question, there being 45 miles over a rough road from Lake Superior to the nearest body of this chain of waters.

This railway connection we expect to have in a few years, as the Government is going to build the link between Lake Superior and Fort Garry as soon as the surveys are finished. Some pretend to say the railway is to terminate on Nepigon Bay instead of Thunder Bay; but we cannot believe that the Government will make such a selection, knowing the advantages of Thunder Bay over Nepigon Bay. The only point in favor of the latter is the saving of building a few miles of railway when building the main line towards Ottawa; providing they find a practicable line to pass on the inside of Lake Nepigon, which is very doubtful, as they have already spent a large sum of money in the search, and failed, as I understood, up to last fall.

The points in favor of Thunder Bay are many, and of great importance. In the first place, the link will be some 29 miles shorter on the whole distance to Fort Garry by the Thunder Bay Line, besides offering less engineering difficulties. In the second place, this line would be the means of opening up a large tract of good agricultural country, besides supplying an essential requisite, which can scarcely be supplied otherwise for years to come, for the purpose of developing the vast mineral resources of the above mentioned tract, by touching on Lac des Mille Lac; while the line from Nepigon would be so far north that it would render this mining district no assistance whatever, nor any other of any importance, as it would pass over old Laurentian gneiss almost entirely, with the exception of the small piece next the coast of Silurian rocks. In the third place, Thunder Bay is highly favored in most respects, for being a great sea-port, it is very deep, free from reefs, wide at the entrance, and surrounded by prominent land marks, so that any number of vessels could sail in by night or day without danger, while Nepigon Bay is shoaly in places, with long, narrow-entering channels, so that vessels in many cases would require to be towed in. And in the fourth and last place, the difference of the opening of navigation is of more importance than all the rest put together, providing the trade of the West becomes great—which no one for a moment can doubt, for the Sault Canal opens on an average two to three days earlier than Thunder Bay, and about ten to fifteen days earlier than Nepigon Bay. This I know to be the truth, for I have had ten years' experience in that section, and last summer and this spring we went to the trouble of gathering all the information on that point that we could, in the shape of written evidences from the Indians and the old inhabitants of that section, most of which we placed in possession of the Government. It is unnecessary for me to state the disastrous effect the late opening of Nepigon Bay would have on trade in the future, when scores of loaded craft would be lying for a week or two, some twenty miles off the port, every spring, unable to unload their cargo or passengers. By taking into consideration the depth, shape, and latitude of the two bays, any rational person can see that it could scarcely be otherwise than as above stated in regard to the opening of navigation.

VARIOUS METALS—UNDEVELOPED DISCOVERIES.

It is unnecessary to say anything about the Otter Head tin, as it is well known to have been a huge swindle; but there are many undeveloped discoveries lying between the Pic and Pigeon Rivers that are worthy of mention, but must be excluded from this paper, as it would carry it far beyond its intended scope.

RESULTS OF NATIVE COPPER MINING.

It may be well to give the general results of the native copper mining of the south shore of Lake Superior. The following table is copied from the *North Western Mining Journal*, of Hancock, Lake Superior, Michigan, dated January 7th, 1874:—

THE MINING STOCK TABLE AND INVESTORS' GUIDE FOR LAKE SUPERIOR.

DIVIDEND MINES.

No. of Shares	Name of Mine.	Total Ass'm'ts Paid.	Average Per Share.	Amount of Dividends Paid	Average Per Share.	Last dividend, when Declared.	Amount in Treasury.	Selling price of Stock.	
								Off'd.	Ask'd
80,000	Calumet & Hecla...	\$300,000	\$10 00	\$6,250,000	\$78 00	\$5—Nov. 15, '73	\$4,000,000	\$140	\$142
20,000	Pittsburg & Boston.	110,000	5 50	2,280,000	114 00				
20,000	Minnesota.	440,000	22 00	1,750,000	87 50	2—Feb., 1872.	20,000	5	5½
20,000	Quincy.	200,000	10 00	1,500,000	75 00	5—Feb. 24, '73	300,000	40	41
20,000	Central.	100,000	5 00	680,000	34 00	8—Feb., 1873.	140,000	30	30
20,000	Pewabic.	240,000	14 00	400,000	20 00	2—Mar. 15, '72	25,000	8	10
20,000	National.	100,000	5 00	300,000	15 00	1—Feb., 1872.	40,000	2	3
20,000	Franklin.	380,000	10 00	240,000	12 00	1—Feb., 1872.	10,000	5	6
20,000	Ridge.	200,000	10 00	110,000	5 50	2—Feb. 15, '73	90,000	7	8
20,000	Copper Falls.	500,000	25 00	100,000	5 00	—Aug. 21, '71	45,000	24	25

We see by the above table, that the total assessment on the ten mines equalled \$3,070,000 and the dividends equalled \$13,610,000, showing a balance of clear profit of \$10,540,000. The least sum expended on either of these mines (the National) before it paid a dividend, was \$100,000. The famous Calumet and Hecla mine, the richest of them all, and one of the richest in the world; as shown by D. D. Ashley, of Boston, in his pamphlet on the Copper Mines of Lake Superior, had been worked for five or six years, the expenditure by assessments being \$800,000 before it paid its first dividend, which, according to the *Ontonagon Miner*, was in December, 1869.

The following statements of the assessments and the products of the copper mines of the South Shore of Lake Superior, are taken from the above mentioned pamphlet, dated 1873, by Mr. O. D. Ashley:—"Assessments levied, as nearly as can be ascertained, since the commencement of operations in 1845, \$17,296,500. Approximate statement of ingot copper produced, and its value:—Copper, 135,075 tons; its value, \$76,303,320."

CONCLUSION.

On our side of the lake, people seem greatly disappointed when a mine does not pay a dividend the first year it is worked, and it is highly probable that there are other silver lodes in the section that will do so, besides the Silver Islet vein. This we know could be made to pay largely from the beginning, with little or no expenditure were it situated on the mainland, and even as it is, there was only \$23,100 paid in by the shareholders, for working capital, to render it a very profitable concern, yet it is probable that the most of the future paying mines will have to be worked from two to five years before they will pay their first dividend.

To conclude, I think I may safely state that our Lake Superior rocks enclose immense wealth, which only require energy and capital to extract; and it is to be hoped that our own people will not hold back and allow it all to pass into other hands, as I might say they have been doing up to the present. At the same time caution is necessary, as we all know that in all transactions, especially in mining, there are unscrupulous men ready to deceive the public for "the mighty dollar."

(Copy.)

THUNDER BAY MINES.

(To the Editor of THE GLOBE.)

SIR:—The valuable articles by Mr. Peter McKellar, on the Thunder Bay Mines, now appearing in the columns of THE GLOBE, are deserving of all praise for the general completeness of their statements.

All mining engineers will agree with Mr. McKellar in his objections to the present mode of surface mining, as carried on at so many of the Thunder Bay Mines. To work those mines successfully, two distinct sets of miners should be employed, one to open out or "make" the mine, and the other to

take out the ore. A shaft, or, if possible, a couple of shafts, should be sunk continuously, and drifts or galleries (with connecting winzes where necessary) should be carried from these at regular ten-fathom depths; and when this work is fairly advanced, another set of miners should commence to take out the ore by stoping between the drifts. If pay-stuff were met with in the shafts and drifts so much the better, but profit can only be fairly looked for in the stopes, as the shafts and many of the drifts may lie accidentally in poor ground—streaks of lean or barren country, to use a mining phrase, occurring here and there in the most productive mines.

I am, Sir, your obedient Servant,

E. J. CHAPMAN.

University College, Feb. 19, 1874.

The following extracts are taken from Prof. R. Bell's Report of the "Mineral Bearing Rocks of Lake Superior," which was published in *The Globe*, March, 1874:—

"During two summers I was assisted by Mr. Peter McKellar, whose admirable paper on Silver Mining on Lake Superior, lately published in *The Globe*, leaves little to be said at present in regard to the history of the mines of that region."

"The Huronian rocks are important as being apparently the mineral-bearing series of the region. Among the economic minerals already found among them are iron, copper, lead, silver, gold, nickel, bismuth, plumbago, and rocks suitable for roofing-slates, building stones, mill-stones, scythe-stones, and hones. I agree with the opinion expressed by Mr. McKellar, that the silver in the veins of the overlying formation may have been derived from the Huronian rocks, and that the gold and silver-bearing veins of the latter, so far as known, occur in or near the dolomitic bands. These bands may have also furnished the calcspar to the veins in the overlying rocks. The gold of British Columbia and other regions occurs in rocks similar to those of the Huronian series."

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